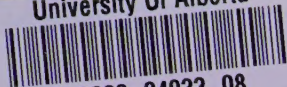


University Of Alberta



0 0002 24933 08

QA
11
J95
1976
Gr.7
Bk.B
e.3

CURR

Junior High Mathematics Consortium

student
exercise book B
grade 7

Ex LIBRIS
UNIVERSITATIS
ALBERTAENSIS



HOW TO STUDY MATHEMATICS

To learn mathematics you must develop good study habits. The following suggestions should be of help:

1. Read carefully and deliberately.

Read the material slowly several times for each word and symbol is important and many thoughts are condensed into a few statements.

2. Think with pencil and scratch paper.

Test out your ideas on paper. Work out all examples even if they have been worked out in the text. "Dig out" the facts. Get started with pencil and paper, don't just sit.

3. Be independent.

Work without assistance. Ask questions only when they are necessary. If you have tried hard, and still do not understand, ask for help - don't wait too long. Don't be afraid of sounding "dumb" when you ask questions.

4. Listen in class.

Pay careful attention to the fine points and to the basic principles as they are discussed.

5. Persevere

Do not become frustrated if at first you do not understand the topic. Stick with it! Insight often comes suddenly. If you are making no progress, put the problem aside and attack it again later.

6. Take time to reflect.

It takes time for some ideas in mathematics to "soak in". Think about them for awhile.

Unit IV rate, ratio & percent p. 1
Unit V measurement p. 15
Unit VI exponents p. 28
Unit VII geometry p. 36

7. Concentrate on fundamentals.

Do not try to learn mathematics by memorizing examples. Concentrate on the fundamental principles and definitions and try to see how these are applied.

8. Be neat and accurate.

Practice accuracy and neatness until they become a habit. Keep your work well organized - your work should always be in the same place.

9. Take time to do your work and do it on time.

Do your homework regularly - no excuses for not having it done will be accepted. Make up work that you have missed. Do not wait until the last minute to do your work and then rush through it. It's not enough to just get the answers; you have to understand the underlying principles.

10. Become actively involved.

Mathematics is not an activity for the intellectually lazy. It requires a strong, steady effort on your part. You cannot learn mathematics by watching others doing it!

There is no extra pay for working hard or conscientiously doing your homework. The "reward" you receive is that you learn it!

- Adapted from "The Mathematics Teacher"

© Edmonton School District No. 7 for the
Junior High Mathematics Consortium, 1976

All rights reserved. Reproduction in any
material form whatever is prohibited with-
out permission of the Superintendent,
Edmonton School District No. 7.

LEVEL 7

UNIT IV

RATE, RATIO & PERCENT

UNIT IV - RATE, RATIO, and PER CENT

CONCEPT CHECK LIST

When you have completed this unit, you should be able to

1. Write rates and ratios in the form $\frac{a}{b}$.
2. Find the missing component in equivalent rates or ratios. $(\frac{A}{B} = \frac{X}{C})$
3. Solve problems involving rates and ratios.

EXERCISES:

OBJECTIVE NO. 1

I. For each set of equivalent fractions find the value of the variable.

$$\frac{3}{4} = \frac{n}{100}$$

$$(1) \frac{3}{4} \times \frac{25}{25} = \frac{n}{100} \quad \text{TWO STEPS!}$$

$$(2) n = 75$$

$$1. \frac{3}{2} = \frac{k}{100}$$

$$2. \frac{n}{100} = \frac{5}{4}$$

$$3. \frac{2}{5} = \frac{x}{100}$$

$$4. \frac{16}{5} = \frac{n}{100}$$

$$5. \frac{n}{100} = \frac{7}{10}$$

$$6. \frac{12}{10} = \frac{x}{100}$$

$$7. \frac{25}{20} = \frac{x}{100}$$

$$8. \frac{15}{25} = \frac{t}{100}$$

$$9. \frac{78}{50} = \frac{x}{100}$$

$$10. \frac{57}{100} = \frac{x}{100}$$

$$*11. \frac{84}{200} = \frac{t}{100}$$

$$*12. \frac{x}{100} = \frac{57}{190}$$

II. Write a fraction with denominator of 100, equivalent to each of the following:

$$\text{EXAMPLE: } \frac{6}{20} = ?$$

$$\frac{n}{100} = \frac{6}{20}$$

$$20 \times n = 6 \times 100$$

$$n = 30$$

$$1. \frac{1}{2}$$

$$2. \frac{5}{2}$$

$$3. \frac{3}{4}$$

$$4. \frac{21}{4}$$

$$5. \frac{2}{5}$$

$$6. \frac{7}{5}$$

$$7. \frac{9}{10}$$

$$8. \frac{16}{10}$$

$$9. \frac{26}{10}$$

$$10. \frac{15}{20}$$

$$11. \frac{16}{20}$$

$$12. \frac{19}{20}$$

$$13. \frac{75}{20}$$

$$14. \frac{4}{25}$$

$$15. \frac{24}{25}$$

$$16. \frac{23}{50}$$

$$17. \frac{49}{50}$$

$$18. \frac{121}{100}$$

$$19. \frac{23}{46}$$

$$20. \frac{134}{200}$$

EXERCISES:

OBJECTIVE NO. 2

State the following rates as a ratio and as a fraction in lowest terms.

- 1) 30 km in 2 hours.
- 2) 3 hits for 10 attempts at bat.
- 3) 1750 revolutions in 5 seconds.
- 4) 3 cans for 90 cents.
- 5) 84 km on 12 litres of gas.
- 6) 2 dozen eggs for \$1.50.
- 7) 900 km in 15 hours.
- 8) 75 answers correct out of a possible 100 questions.
- 9) 100 m in 10 seconds.
- 10) 45 revolutions in 3 minutes.
- 11) 50 teeth on a front sprocket and 10 in a back sprocket.
- 12) Number of boys in your class to total number of students in your class.
- 13) Number of grade seven classes to total number of classes in your school.
- 14) Number of science teachers to math teachers.
- 15) Teams in NHL playoffs to total teams.
- 16) Number of m in a km to number of cm in a km.
- 17) Number of cm in a m to mm in a cm.
- 18) 40 hits to 100 times at bat.
- 19) 5 cans of peas for \$1.00.
- 20) 4 goals in 160 shots on goal.
- 21) The number of legs on a frog to the number of legs on a spider.
- 22) The number of cents in fifty cents to the number of cents in five dollars.
- 23) The number of minutes in 1 hour and the number of minutes in one day.
- 24) The number of Canadian provinces to the number of provincial capitals.
- 25) The number of windows in your classroom to the number of doors in the room.
- 26) The number of players in the starting line up of a hockey team to the number on a baseball team.



EXERCISES:

OBJECTIVE NO. 3

A. Find the missing component in each of the following equivalent fractions:

$$\frac{3}{15} = \frac{n}{60}$$

$$15 \times n = 3 \times 60$$

$$n = 12$$

THREE CORRECT METHODS

USE THE ONE YOU FIND

EASIEST

$$\frac{5}{8} = \frac{n}{24}$$

$$\frac{5}{8} \times 24 = \frac{n}{24} \times 24$$

$$15 = n$$

$$\frac{5}{12} = \frac{n}{48}$$

$$12 \times 4 = 48$$

$$\Delta O \ 5 \times 4 = n$$

$$n = 20$$

1. $\frac{3}{10} = \frac{x}{20}$

2. $\frac{4}{5} = \frac{k}{10}$

3. $\frac{70}{80} = \frac{p}{16}$

4. $\frac{7}{t} = \frac{35}{40}$

5. $\frac{1}{3} = \frac{r}{12}$

6. $\frac{m}{64} = \frac{7}{16}$

7. $\frac{9}{18} = \frac{25}{n}$

8. $\frac{7}{14} = \frac{42}{x}$

9. $\frac{100}{46} = \frac{q}{23}$

10. $\frac{42}{x} = \frac{7}{6}$

11. $\frac{3}{2} = \frac{x}{150}$

12. $\frac{1}{5} = \frac{m}{25}$

13. $\frac{4}{5} = \frac{x}{100}$

14. $\frac{5}{6} = \frac{35}{n}$

15. $\frac{7}{8} = \frac{77}{p}$

16. $\frac{6}{8} = \frac{5}{s}$

17. $\frac{16}{4} = \frac{5}{p}$

18. $\frac{13}{39} = \frac{x}{180}$

19. $\frac{42}{36} = \frac{28}{r}$

20. $\frac{p}{5} = \frac{375}{120}$



$$\frac{5}{t} = \frac{25}{37}$$

WHAT TO DO??

FLIPPEROO !!

$$\frac{t}{5} = \frac{37}{25}$$

REVIEW EXERCISES:

OBJECTIVE NO'S 1 - 3

- Find answers to each of the questions below.
- Place the letter at the left of each question in the corresponding blank at the bottom of the page. (match answers). Warning: Some letters will be used more than once.
- When you have correctly answered all questions and matched accordingly, you will have the answer to this riddle:

WHAT IS LARGE, GREEN, AND SWIMS IN THE OCEAN?

E: $\frac{3}{5} = \frac{x}{100}$; $x = ?$

N: $\frac{4}{7} = \frac{x}{14}$; $x = ?$

K: $\frac{x}{10} = \frac{40}{100}$; $x = ?$

Y: $\frac{42}{63} = \frac{14}{x}$; $x = ?$

W: $\frac{7}{2} = \frac{x}{100}$; $x = ?$

I: $\frac{121}{11} = \frac{22}{x}$; $x = ?$

S: $\frac{1}{x} = \frac{20}{100}$; $x = ?$

A: $8:20 = x:40$, $x = ?$

O: The ratio $\frac{72}{108}$ reduced.

T: $\frac{36}{100} = \frac{9}{x}$; $x = ?$

B: Ratio of 3 cans of soup for \$1.00.

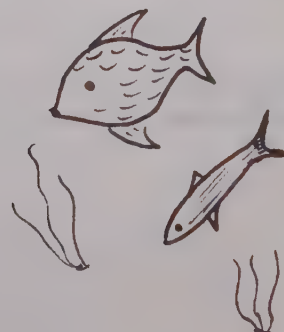
M: Ratio of 5 litres of gas per 2 km.

D: The ratio $\frac{8}{4}$ reduced.

L: $\frac{x}{100} = \frac{1}{5}$; $x = ?$

H: Ratio $\frac{1}{2}$ dozen pop cans for \$1.00.

$\frac{25}{16}$	$\frac{6}{5}$	$\frac{60}{2}$	$\frac{350}{3}$	$\frac{6}{1}$	$\frac{16}{21}$	$\frac{20}{1}$	$\frac{60}{2}$	$\frac{4}{20}$	$\frac{8}{20}$	$\frac{2}{3}$	$\frac{350}{20}$	$\frac{8}{8}$
-----------------	---------------	----------------	-----------------	---------------	-----------------	----------------	----------------	----------------	----------------	---------------	------------------	---------------



EXERCISES:OBJECTIVE NO. 4

Use the steps of problem solving to solve each problem.

1. A salesman travels 225 km from Edmonton to Slave Lake in 3 hours. At that rate, how far could he travel in 5 hours?
2. Canned soft drinks sell at a rate of 8 cans for \$1.00. At that price, what is the cost of 30 cans?
3. The Coronation Swimming Pool is being filled with water at the rate of 350 litres in 2 minutes. The capacity of the pool is 28 000 litres. How long will it take to fill the pool?
4. Jim was paid \$6.15 for selling 410 Edmonton Journals. How much could he have earned if he had sold 600 Edmonton Journals?
5. One and one-half tonne of apples sold at the orchard for \$420.00. At that rate, what is a 25 kg sack of apples worth? (1 tonne = 1000 kg)
6. A Boeing 707 travels 2000 km in 2.5 hours. At that rate, how long should it take to travel 1200 kilometres?
7. A car used 15 litres of gasoline in travelling 90 kilometres. At that rate, how many litres will it use on a 800 kilometre trip?
8. Judy can buy 2 kg of coffee for \$4.76. How much will Judy pay for 6 kg of coffee?
9. In a school election at St. Mary's, Dan received five votes to every two votes Andy received. If Andy got 120 votes, how many did Dan receive?
10. The ratio of red jelly beans to yellow jelly beans is 4:3. In a mixture of candy, if there are 16 kg of red jelly beans, how many kilograms of yellow jelly beans are there?
11. The ratio of the length of a side of a rectangle to its width is 6:5. If the length is 30 cm, what is the width?
12. Bob gets 7 hits for every 15 times he is at bat. Last year, while playing baseball he was at bat 45 times. How many hits did he get?
13. At four o'clock during the month of May, the ratio of a man's height to the shadow he casts is 9:5. If a man is 180 cm tall, how long is his shadow at four o'clock?
14. A stack of 40 papers is 1 cm high. How high is a stack of 260 papers?
15. A certain stock is listed at \$50.50 per share. At that rate, how many shares of this stock can Mr. King buy for \$1000.00?
16. On a map scale a line 5 cm long represents 100 km. How long a line is needed to represent a distance of 340 kilometres?

EXERCISES:

OBJECTIVE NO. 4

17. If a boy can walk from his house to school (10 blocks) in 15 minutes, how long would it take him to go at the same rate from his house to the corner store 5 blocks beyond the school?
18. My two year old daughter takes 9 steps to go as far as I do in 2 steps. At this rate, how many steps will she take to cover the distance I go in 360 steps?
19. A man wants to buy some root beer for his family.
Two stores advertise the following:
Store A: 5 glasses for \$1.15
Store B: 6 glasses for \$1.26
- (a) Which store sells at the cheaper rate?
- (b) At this rate, how much would he pay for 8 glasses?



EXERCISES:

OBJECTIVE NO. 5

Find the missing numerator, then write as a percent. Do as many as you can by inspection.

1) $\frac{1}{4} = \frac{\quad}{100} = \quad\%$

2) $\frac{2}{3} = \frac{\quad}{100} = \quad\%$

3) $\frac{3}{8} = \frac{\quad}{100} = \quad\%$

4) $\frac{5}{8} = \frac{\quad}{100} = \quad\%$

5) $\frac{1}{5} = \frac{\quad}{100} = \quad\%$

6) $\frac{5}{6} = \frac{\quad}{100} = \quad\%$

7) $\frac{8}{5} = \frac{\quad}{100} = \quad\%$

8) $\frac{27}{20} = \frac{\quad}{100} = \quad\%$

9) $\frac{38}{15} = \frac{\quad}{100} = \quad\%$

10) $\frac{1}{6} = \frac{\quad}{100} = \quad\%$

11) $3\frac{1}{5} = \frac{\quad}{100} = \quad\%$

12) $\frac{125}{1000} = \frac{\quad}{100} = \quad\%$

13) $\frac{60}{500} = \frac{\quad}{100} = \quad\%$

$$\frac{7}{16} = \frac{\quad}{100} = \quad\%$$

$$\frac{7}{16} \times 100 = \frac{n}{100} \times 100$$

$$n = \frac{700}{16}$$

$$n = 43\frac{3}{4}$$

$$\therefore 43\frac{3}{4}\%$$

14) $1\frac{3}{4} = \frac{\quad}{100} = \quad\%$

15) $3\frac{1}{4} = \frac{\quad}{100} = \quad\%$

16) $17\frac{4}{5} = \frac{\quad}{100} = \quad\%$

17) $\frac{17}{25} = \frac{\quad}{100} = \quad\%$

18) $\frac{8}{96} = \frac{\quad}{100} = \quad\%$

19) $7\frac{5}{8} = \frac{\quad}{100} = \quad\%$

20) $5\frac{1}{5} = \frac{\quad}{100} = \quad\%$

MEMORY BANK

Fraction %

$\frac{1}{2}$

50

$\frac{1}{3}$

 $33\frac{1}{3}$

$\frac{2}{3}$

 $66\frac{2}{3}$

$\frac{1}{4}$

25

$\frac{3}{4}$

75

$\frac{1}{5}$

20

$\frac{2}{5}$

40

$\frac{3}{5}$

60

$\frac{4}{5}$

80

THINK!

$\frac{1}{4} \rightarrow 25\%$

$2\frac{3}{4} = \frac{11}{4} \quad 11 \times \frac{1}{4}$

$= 11 \times 25\%$

$2\frac{3}{4} = 275\%$



EXERCISES:OBJECTIVE NO. 6

Express the following percents as basic fractions: (You may use your memory bank).

- | | | | |
|----------------------|----------|-----------------------|-----------------------|
| 1. 25% | 2. 75% | 3. 60% | 4. $87\frac{1}{2}\%$ |
| 5. $33\frac{1}{3}\%$ | 6. 125% | 7. $37\frac{1}{2}\%$ | 8. $116\frac{2}{3}\%$ |
| 9. 12.25% | 10. 119% | 11. 44% | 12. 5% |
| 13. 15% | 14. 32% | 15. 100% | 16. 1% |
| 17. 1000% | 18. 68% | 19. 6.5% | 20. 8.4% |
| 21. 50% | 22. 112% | 23. $3\frac{1}{3}\%$ | 24. 40% |
| 25. 150% | 26. 82% | 27. 0.01% | 28. 0.5% |
| 29. $9\frac{1}{4}\%$ | 30. 8% | 31. $83\frac{1}{3}\%$ | 32. 6.25% |



$$33\frac{1}{3}\% = ?$$

$$\frac{33\frac{1}{3}}{100} = 33\frac{1}{3} \div 100$$

$$= 33\frac{1}{3} \times \frac{1}{100}$$

$$= \frac{100}{3} \times \frac{1}{100}$$

$$= \frac{1}{3}$$

EXERCISES:

OBJECTIVE NO. 7

Draw a straight line connecting the decimal numbers at the left with the equivalent percent at the right. Each line will cross one letter and one number. The number tells you where to put the letter in the line of boxes at the bottom of the page. When you have finished you will have discovered

"WHAT IS THE MAIN PURPOSE OF THE HUMAN SKIN?"

Value	Label	Value	Label
0.5	.	460%	.
0.85	.	600.5%	.
3.75	(T)	33.3%	.
4.6	.	24.5%	.
1.8	(H)	99%	.
0.333	.	0.03%	.
0.04	(E)	4.5%	.
0.9625	.	180%	.
0.245	.	4%	.
0.005	.	6250%	.
0.045	.	375%	.
47.3	.	830%	.
6.875	(N)	687.5%	.
8.3	.	0.5%	.
0.99	.	149%	.
62.5	(U)	21%	.
7.75	.	50%	.
6.005	.	96.25%	.
0.0003	.	62.5%	.
0.21	(R)	85%	.
1.49	.	3706%	.
37.06	.	4730%	.
0.625	.	775%	.

1 2 3 4 5 6 7 8 9 10

11	12	13	14	15	16	17	18	19	20	21	22	23
----	----	----	----	----	----	----	----	----	----	----	----	----

EXERCISES:

OBJECTIVE NO. 8

I. DIRECTIONS: Express each percent as a decimal numeral.

Find your answer in the rectangle below and cross it out.

The boxes not crossed out will spell out the message.

10% =

228% =

3.75% =

$87\frac{1}{2}\% =$

47.5% =

75% =

400% =

100% =

65% =

25% =

600% =

$33\frac{1}{3}\% =$

3% =

$62\frac{1}{2}\% =$

$6\frac{1}{2}\% =$

5% =

14% =

8% =

24.5% =

12.5% =

4.5% =

0.01% =

$7\frac{3}{4}\% =$

1% =

135% =

HIDDEN MESSAGE

T 4	H 1.2	M 0.625	A 10	N 3.85	S 1.35	N 0.65	G 2.45
I 0.2	O 0.0775	N 6.5	O 0.75	F 0. $\overline{3}$	G 3.0	I 1.25	E 6
I 0.045	S 65	F 0.3	A 0.10	F 0.03	U 875	L 0.5	P 0.0375
L 40	O 0.0075	P 0.14	R 0.475	F 2.028	H 0.125	S 5	U 0.3
U 0.875	S 0.08	S 0.228	P 0.375	S 0.0001	E 0.375	N 0.0625	S 2.28
N 0.065	G 0.245	B 0.25	L 0.05	S 6	E 0.135	A 1	A 0.01



II. Complete the following chart for each value in each column and decode the answer to the riddle.

1.	$\frac{1}{10}$		(l)	
2.	$\frac{1}{5}$	(k)		
3.		$\frac{90}{100}$	(f)	
4.	(b)	$\frac{40}{100}$		
5.			0.70	(t)
6.		(x)	0.25	
7.		(u)		50%
8.	(q)		(p)	80%
9.		$\frac{75}{100}$		(v)
10.	(d)	$\frac{12.5}{100}$	1.20	
11.			(g)	
12.	$\frac{13}{10}$		(h)	
13.		(n)		125%
14.	$\frac{1}{3}$			(d)
15.	(i)		(s)	$16\frac{2}{3}\%$
16.			0.375	(w)
17.	$\frac{2}{3}$	(c)		
18.	$\frac{15}{25}$		(e)	
19.	(m)			87.5%
20.		(a)		$83\frac{1}{3}\%$

WHAT ARE THE TWO METRIC INSECTS?

$\frac{66\frac{2}{3}}{100}$ 0.6 $\frac{125}{100}$ 70% $\frac{1}{6}$ $\frac{7}{8}$ 0.6 70% $\frac{20}{100}$ 0.6 0.8 0.6 $33\frac{1}{3}\%$ 0.6 0.16

AND

0.1 $\frac{1}{6}$ 70% $\frac{20}{100}$ 0.6 $\frac{4}{10}$ $\frac{50}{100}$ 0.125 0.16



EXERCISES:OBJECTIVE NO. 9

I. Solve each of the following:

- | | |
|-------------------|---------------------|
| 1) 48 is n% of 40 | 6) n% of 6.4 is 5.6 |
| 2) n% of 12 is 9 | 7) 90% of 56 is n |
| 3) 24 is n% of 30 | 8) 28% of n is 56 |
| 4) n% of 25 is 75 | 9) 120% of 60 is n |
| 5) 40% of 75 is n | 10) 27 is n% of 36 |

REMINDER*36 is n% of 144*

$$36 = \frac{n}{100} \times 144$$

$$100 \times 36 = 100 \times \frac{n}{100} \times 144$$

$$3600 = n \times 144$$

$$\frac{3600}{144} = n$$

$$25\% = n$$

II. Solve using proper problem procedures:

1. *Introductory Sentence: Explain the variable.*
2. *Translation: Mathematical sentence.*
3. *Solution of Math sentence.*
4. *Answer as a statement.*

1. Of a class of 32 pupils, 4 were absent on Friday. This is what percent of the class?
2. On an exam Brian did 16 of 20 problems correctly.
 - (a) What percent did he do correctly?
 - (b) What percent did he get wrong?
3. Bob purchased a book that had been priced at \$3.50 for the reduced price of \$2.80. The reduction was what percent of the original price?
4. The basketball team won 10 of its 16 games. What percent of their games did they win?
5. There are 172 pupils in the seventh grade at Leduc Junior High School. Of these, 43 are on the honor roll. What percent of the students in grade seven are on the honor roll?
6. A boy on October 15 this year was 160 cm tall. Last year on October 15 he was 140 cm tall. What percent of his old height has he grown?
7. The speed limit was reduced from 90 kilometres per hour to 75 kilometres per hour. What was the percent reduction?
8. Our class shrunk from 32 students to 28. What percent remained?
9. In a grade seven class totalling 30, 18 are boys. What percent of the class are girls?
10. We expected 80 boys would register for a camping trip. Actually 100 registered. What percent of our expected number actually registered?
- *11. A girl is making a leather belt. She measured her waist to be 80 cm. If she allows 5% for the overlap, how long a piece of leather should she cut?
12. After travelling 600 km we had covered 60% of our trip. How many kilometres will we travel in the whole trip?

REVIEW EXERCISES:

OBJECTIVE NO. 1 - 9

I. Complete the following puzzle:

1	2		4	7		8	9
3			5			10	
			6			11	
14		19			12		
15				22		13	
		20	21		25		
16	18		23	24			27
17			26				

DOWN

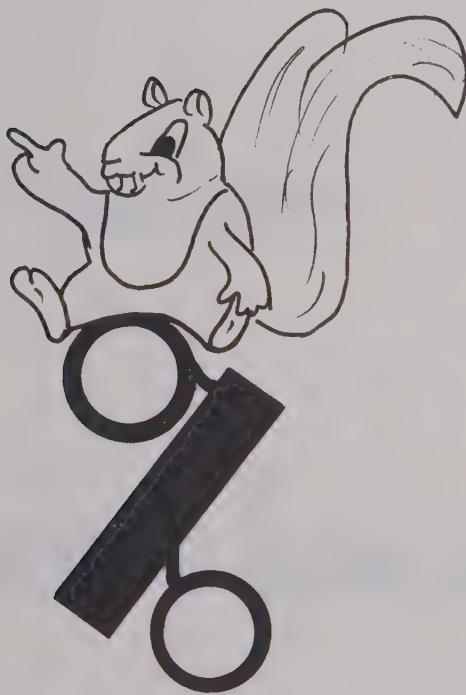
1. $\frac{1}{2} = \underline{\hspace{1cm}}\%$
2. $5 = \underline{\hspace{1cm}}\%$
4. $816\% = \underline{\hspace{1cm}}$ (decimal)
7. $5\frac{7}{50} = \underline{\hspace{1cm}}\%$
8. $427.23 = \underline{\hspace{1cm}}\%$
9. $0.023 = \underline{\hspace{1cm}}\%$
12. $\frac{2}{200} = \underline{\hspace{1cm}}\%$
14. $21.046 = \underline{\hspace{1cm}}\%$
18. $\frac{1}{4} = \underline{\hspace{1cm}}\%$
19. $2\frac{1}{20} = \underline{\hspace{1cm}}\%$
21. $2.13 = \underline{\hspace{1cm}}\%$
22. $\frac{49}{700} = \underline{\hspace{1cm}}\%$
24. $\frac{124}{200} = \underline{\hspace{1cm}}\%$
25. $3.04 = \underline{\hspace{1cm}}\%$
27. $\frac{17}{25} = \underline{\hspace{1cm}}\%$

ACROSS

1. $\frac{11}{20} = \underline{\hspace{1cm}}\%$
3. $0\% = \underline{\hspace{1cm}}$
4. $\frac{17}{20} = \underline{\hspace{1cm}}\%$
5. $0.11 = \underline{\hspace{1cm}}\%$
6. $\frac{16}{25} = \underline{\hspace{1cm}}\%$
8. $\frac{2}{5} = \underline{\hspace{1cm}}\%$
10. $0.2 = \underline{\hspace{1cm}}\%$
11. $\frac{42}{60} = \underline{\hspace{1cm}}\%$
12. $1\frac{11}{50} = \underline{\hspace{1cm}}\%$
13. $0.33 = \underline{\hspace{1cm}}\%$
15. $\frac{30}{20} = \underline{\hspace{1cm}}\%$
16. $\frac{21}{50} = \underline{\hspace{1cm}}\%$
17. $\frac{26}{40} = \underline{\hspace{1cm}}\%$
20. $\frac{26}{50} = \underline{\hspace{1cm}}\%$
22. $3\frac{1}{2} = \underline{\hspace{1cm}}\%$
23. $1\frac{3}{5} = \underline{\hspace{1cm}}\%$
26. $324\% = \underline{\hspace{1cm}}$ (decimal)

II. Solve each of the following (use proper problem procedure):

1. 65 is what percent of 60?
2. 112% of 6 is what number?
3. 435 is 60% of what number?
4. St. Albert has a population of 25 000. Edmonton has a population of 625 000. What percent is St. Albert's population of Edmonton's population?
5. John purchased a book that has a regular price of \$5.00. He received a 40% discount. What did he pay for the book?



LEVEL 7

UNIT V

MEASUREMENT

UNIT V - MEASUREMENT

CONCEPT CHECK LIST

When you have completed this unit, you should be able to:

1. Define measurement as comparison
2. State reasons for standardized systems of measurement.
3. Use the SI system of measurement for lengths.
 - (a) State the appropriate prefixes for the units.
 - (b) State the relationship between the units. (km, hm, dam, m, dm, cm, mm)
4. Convert from one unit to another. (km, m, cm, mm)
5. Measure objects accurately. (m, cm, mm)
6. Add and subtract the units of length.
7. Solve problems involving measurement.

EXERCISES:

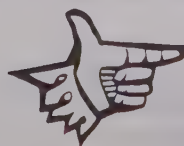
OBJECTIVE NO. 1, 2 & 3

MEASUREMENT LAB

- I.
 1. Have each member of your group measure the width of a desk in spans and digits. Record your results.
 2. Have each member measure the width of the classroom in feet (use your own). Record your results.
 3. Have each member find the length of the chalkboard in cubits. Record your results.
 4. Do all the results in your group agree? Why not? How could your results be more nearly the same?

- II.
 1. Measure the length and width of your desk without the use of any formal measuring device.
 2. Describe the method you used and your results.
 3. Compare your results with the other members of your group. Did they use the same method? If not, what method did they use?
 4. Measure your desk again but use the other persons' method. Do your results agree?
 5. What similarity exists in the two methods you used?

- III. Mr. Jones wishes to build a picket fence. He needs 165 pickets and by using his hand discovers that each picket is to be six spans and three digits long. To save time he asks eleven of his friends to measure fifteen pickets each and cut them that length.
 1. Describe the fence if Mr. Jones builds it using the pickets made by his eleven friends.
 2. How could Mr. Jones use the pickets cut by his friends to create a pleasing fence?



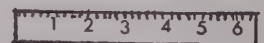
I. EQUIPMENT - METRE STICK

There are three measures of length in the metric system less than one metre. From smallest to largest these are:

- (i) millimetre (mm)
- (ii) centimetre (cm)
- (iii) decimetre (dm)

1. Examine the different markings on the metre stick. Look at the numbers carefully.
 - a) Between the digits, the different markings are arranged in groups of ____?
 - b) Draw a line the length of which is equal to the largest subdivision on the metre stick.
 - c) How many of these units are there in a metre?
 - d) What fraction of the metre stick is this unit? What is this fraction as a decimal?
 - e) What is the name of this unit?
2. Examine another unit on your metre stick that is about the same size as the width of your smallest finger.
 - a) Draw a line as long as this unit.
 - b) Record the number of these units on the metre stick.
 - c) What fraction of the metre stick is this unit? What decimal fraction? What is the name of this unit?
 - d) What number of these units make up a decimetre?
 - e) What fraction of the decimetre is this unit? What decimal fraction?
3. Examine the smallest unit on your metre stick that is about the width of a toothpick.
 - a) Draw a line as long as this unit.
 - b) How many of these units are there in a metre? What is the name of this unit?
 - c) How many of these units are there in each of the other units? decimetre, centimetre.
 - d) What fraction and decimal fraction is this unit of each of the following: (Draw the table in your assignment book.)

UNIT	FRACTION	DECIMAL
metre		
decimetre		
centimetre		



4. Complete the following statements. As the units in the metric system increase in size, each unit is

- a) _____ times as large as the one below it.
- b) _____ millimetres equal one metre.
- c) _____ centimetres equal one metre.
- d) _____ decimetres equal one metre.
- e) _____ millimetres equal one decimetre.
- f) _____ centimetres equal one decimetre.
- g) _____ millimetres equal one centimetre.

EXERCISES:

OBJECTIVE NO. 5

I. Copy and complete the following chart.

1 mm =	1 cm =	1 dm =	1 m =	1 dam =	1 hm =	1 km =
_____ mm*	_____ mm*	_____ mm*	_____ mm*	_____ mm*	_____ mm*	_____ mm*
_____ cm*	_____ cm*	_____ cm*	_____ cm*	_____ cm*	_____ cm*	_____ cm*
_____ dm	_____ dm	_____ dm	_____ dm	_____ dm	_____ dm	_____ dm
_____ m*	_____ m*	_____ m*	_____ m*	_____ m*	_____ m*	_____ m*
_____ dam	_____ dam	_____ dam	_____ dam	_____ dam	_____ dam	_____ dam
_____ hm	_____ hm	_____ hm	_____ hm	_____ hm	_____ hm	_____ hm
_____ km*	_____ km*	_____ km*	_____ km*	_____ km*	_____ km*	_____ km*

II. Convert each of the following to the indicated unit.

- | | |
|----------------------|------------------------|
| 1. 1000 mm = _____ m | 11. 1000 m = _____ km |
| 2. 10 km = _____ m | 12. 100 mm = _____ m |
| 3. 1000 m = _____ km | 13. 10 m = _____ km |
| 4. 1 km = _____ mm | 14. 1000 m = _____ hm |
| 5. 100 cm = _____ m | 15. 1000 mm = _____ m |
| 6. 1 km = _____ cm | 16. 1000 mm = _____ dm |
| 7. 10 mm = _____ cm | 17. 0.1 m = _____ mm |
| 8. 1 m = _____ dm | 18. 0.1 km = _____ m |
| 9. 10 km = _____ mm | 19. 0.1 cm = _____ mm |
| 10. 10 hm = _____ km | 20. 10 cm = _____ km |

III. Convert each of the following to the indicated unit:

- | | |
|--------------------------|--------------------------|
| 1. 200 cm = _____ m | 11. 1 389 dm = _____ mm |
| 2. 5 000 m = _____ km | 12. 1 843 m = _____ dam |
| 3. 3 000 cm = _____ m | 13. 592 cm = _____ m |
| 4. 4 km = _____ m | 14. 592 mm = _____ m |
| 5. 9 000 m = _____ km | 15. 76.243 dm = _____ km |
| 6. 100 m = _____ km | 16. 358.3 m = _____ cm |
| 7. 378 cm = _____ mm | 17. 0.32 hm = _____ cm |
| 8. 46 982 cm = _____ km | 18. 20 dm = _____ m |
| 9. 88 cm = _____ km | 19. 0.1 hm = _____ mm |
| 10. 0.382 dam = _____ km | 20. 0.008 km = _____ m |

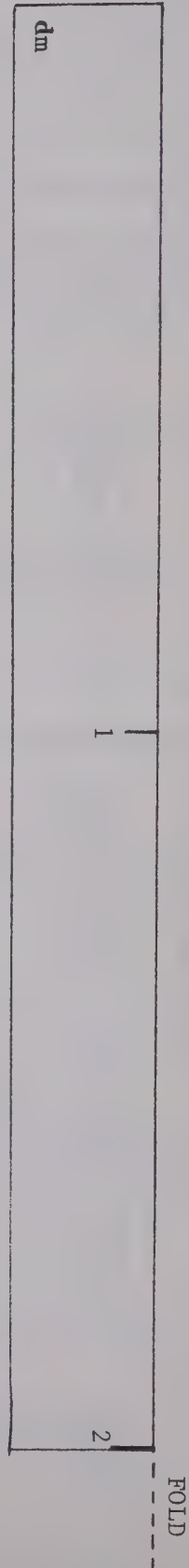
IV. a) Draw and complete the following chart.

b) Circle the preferred unit for the expression of the given length.

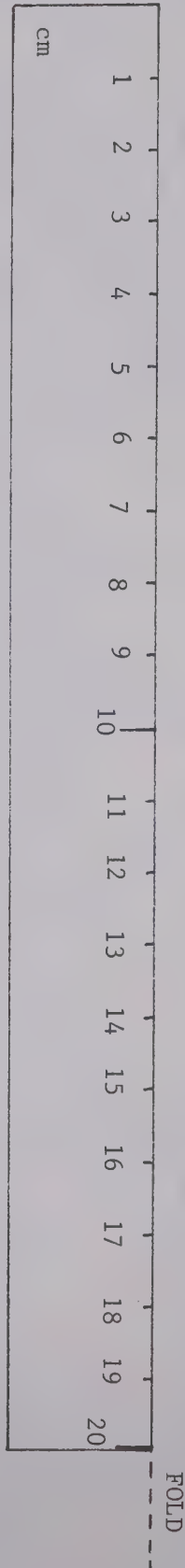
mm	cm	m	dam	km
			62 dam	
				4.3 km
	642 311 cm			
		1 428 m		
62 341 mm				
		16 m		
	132 cm			
			432 dam	
				61.42 km

EXERCISES:

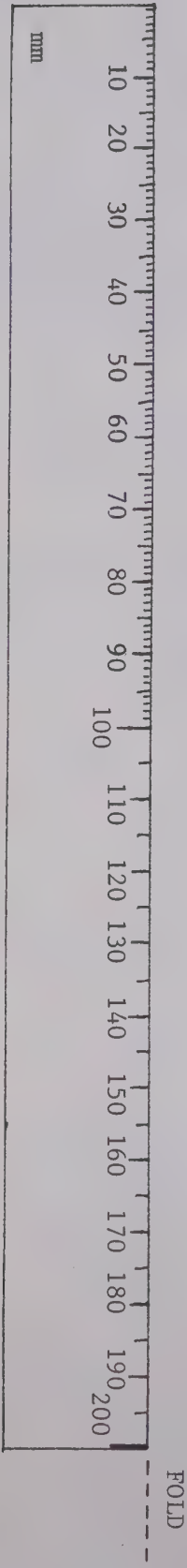
I.



METRIC RULER ONE



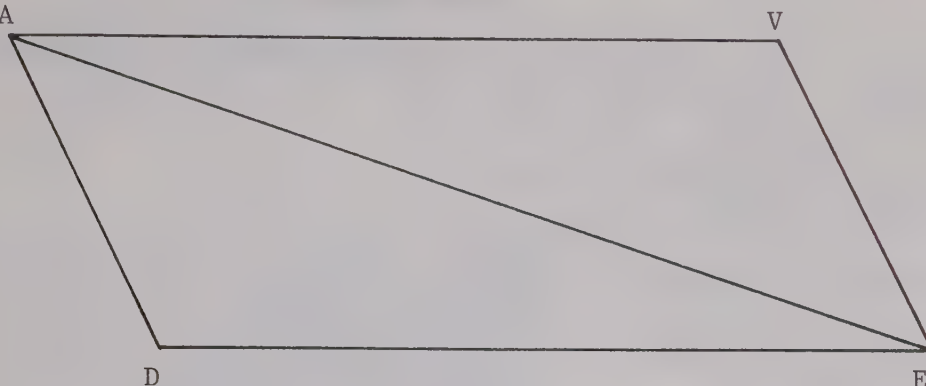
METRIC RULER TWO



METRIC RULER THREE

Measure each of the following using the indicated ruler.

1. A

(a) Ruler #1

$$m(\overline{AV}) = \underline{\hspace{2cm}}$$

$$m(\overline{AE}) = \underline{\hspace{2cm}}$$

$$m(\overline{AD}) = \underline{\hspace{2cm}}$$

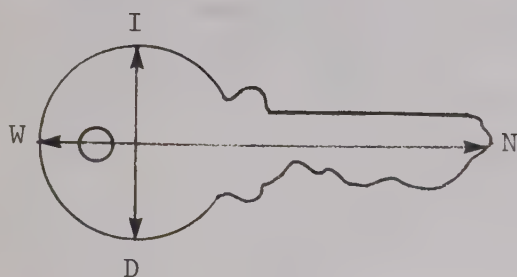
(b) Ruler #2

$$m(\overline{AV}) = \underline{\hspace{2cm}}$$

$$m(\overline{AE}) = \underline{\hspace{2cm}}$$

$$m(\overline{AD}) = \underline{\hspace{2cm}}$$

2.

(a) Ruler #2

$$m(\overline{WN}) = \underline{\hspace{2cm}}$$

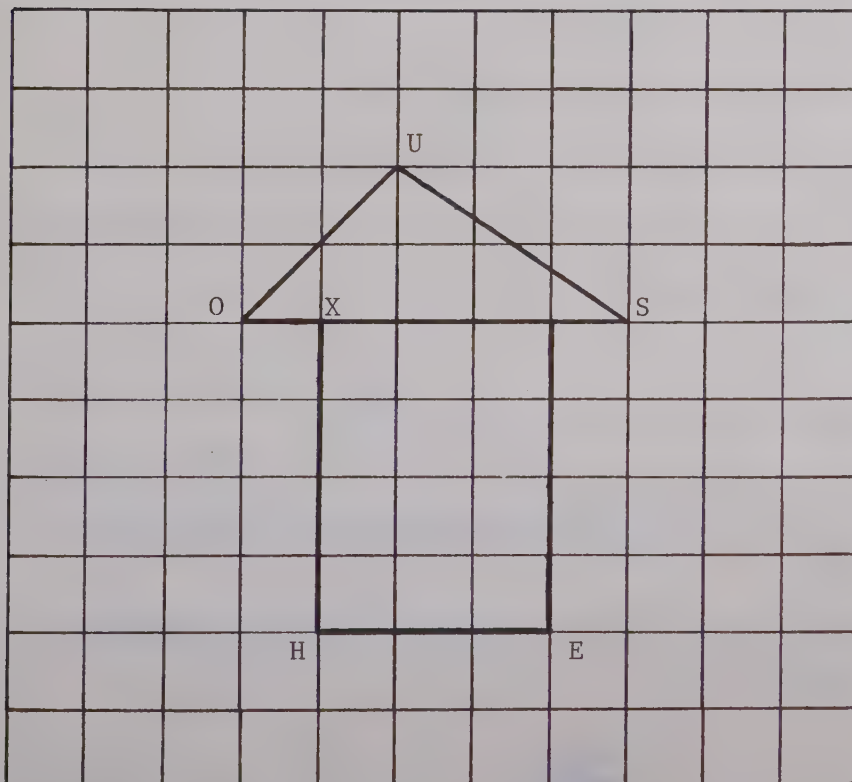
$$m(\overline{ID}) = \underline{\hspace{2cm}}$$

(b) Ruler #3

$$m(\overline{WN}) = \underline{\hspace{2cm}}$$

$$m(\overline{ID}) = \underline{\hspace{2cm}}$$

3.

(a) Ruler #2

$$m(\overline{HX}) = \underline{\hspace{2cm}}$$

$$m(\overline{OU}) = \underline{\hspace{2cm}}$$

$$m(\overline{US}) = \underline{\hspace{2cm}}$$

$$m(\overline{HE}) = \underline{\hspace{2cm}}$$

(b) Ruler #3

$$m(\overline{HX}) = \underline{\hspace{2cm}}$$

$$m(\overline{OU}) = \underline{\hspace{2cm}}$$

$$m(\overline{US}) = \underline{\hspace{2cm}}$$

$$m(\overline{HE}) = \underline{\hspace{2cm}}$$



EXERCISES:

OBJECTIVE NO. 6

II. EQUIPMENT - Metre stick graduated in: - decimetres only
- centimetres only

1. Measure each of the following. Use the scale graduated in decimetres only, and record your results in Table #1.
 - a) Height of the doorway.
 - b) Length of your pace (heel to heel).
 - c) Your partner's height.
 - d) Width of the classroom.

TABLE #1

OBJECT	dm	cm
Height of doorway		
Length of your pace		
Your partner's height		
Width of the classroom		

2. Remeasure each of the above using the scale graduated in centimetres only, and record the results in Table #1.

3. Convert the measures in Table #1 all to centimetres. Are any of the measures for which you used the decimetre scale the same as the measures for which you used the centimetre scale? Why?
4. Which ruler gave you a more precise measure? Why?
5. Is measurement exact with any of these rulers?
6. Is any measuring instrument 100% accurate?

III. EQUIPMENT - metric ruler or metre stick.

Measure each of the following segments in dm, cm, and mm.

1. _____ dm _____ cm _____ mm
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. Which of the above segments have the same measure in decimetres?
In centimetres?
12. Does this mean that these pairs of segments are the same length?
Explain your answer.



EXERCISES:

OBJECTIVE NO. 6

IV. Measure each of the following segments to the indicated accuracy. Give the solutions for the following in your assignment book.

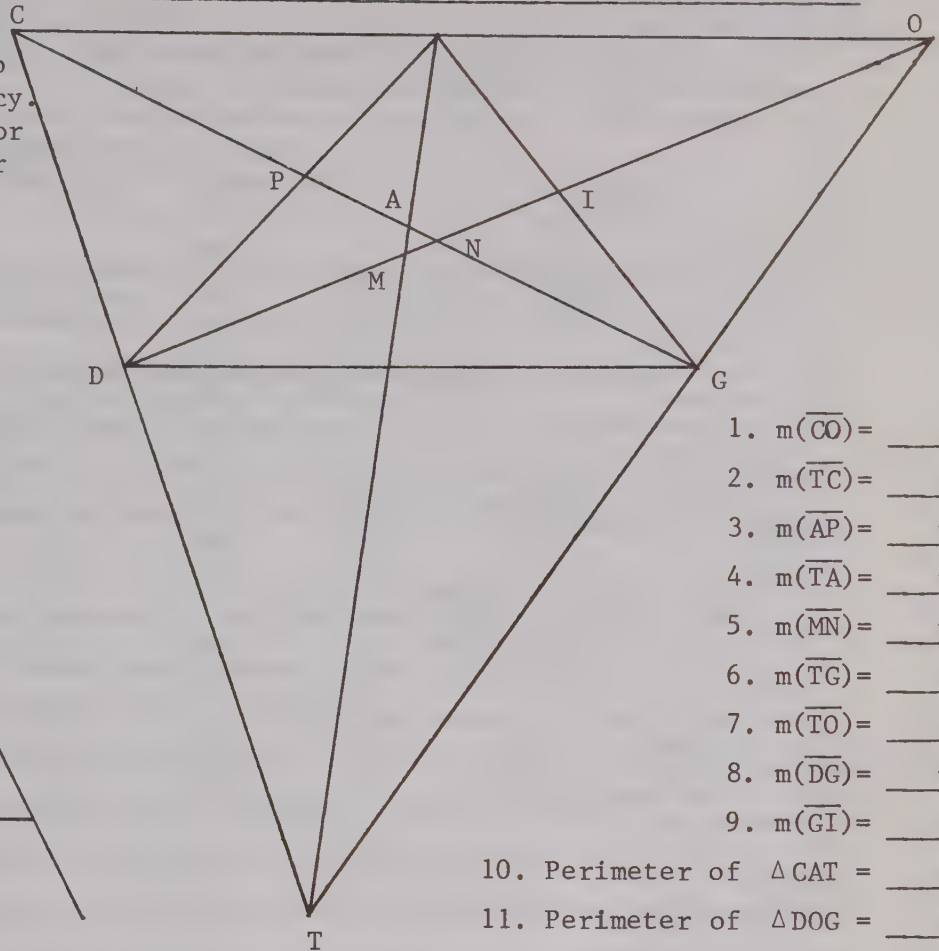
M

E

A

S

U



1. $m(\overline{CO}) = \underline{\hspace{1cm}} \text{ cm}$

2. $m(\overline{TC}) = \underline{\hspace{1cm}} \text{ cm}$

3. $m(\overline{AP}) = \underline{\hspace{1cm}} \text{ mm}$

4. $m(\overline{TA}) = \underline{\hspace{1cm}} \text{ mm}$

5. $m(\overline{MN}) = \underline{\hspace{1cm}} \text{ mm}$

6. $m(\overline{TG}) = \underline{\hspace{1cm}} \text{ cm}$

7. $m(\overline{TO}) = \underline{\hspace{1cm}} \text{ cm}$

8. $m(\overline{DG}) = \underline{\hspace{1cm}} \text{ mm}$

9. $m(\overline{GI}) = \underline{\hspace{1cm}} \text{ cm}$

10. Perimeter of $\triangle CAT = \underline{\hspace{1cm}} \text{ cm}$

11. Perimeter of $\triangle DOG = \underline{\hspace{1cm}} \text{ cm}$

12. Perimeter of $\triangle MAN = \underline{\hspace{1cm}} \text{ mm}$

V. EQUIPMENT - Metric ruler

Find the measure of: (all in mm)

1. Total length of all segments of M is?

2. Base of the first E is?

3. Spine of the R is?

4. Bar in the A is?

5. Top of the second E is?

6. Leg of the R is?

R

E

EXERCISES:

OBJECTIVE NO. 7

- I. You and your partner should estimate (make a good guess) for the length of each of the following and check by measuring. The units you are to use are in the table. Copy and complete the chart.

LENGTH OF	YOUR ESTIMATE	YOUR PARTNER'S ESTIMATE	MEASURED LENGTH
a) desk	cm	cm	cm
b) door	m	m	m
c) pencil	cm	cm	cm
d) eraser	mm	mm	mm
e) window	cm	cm	cm
f) ledge on the blackboard	m	m	m
g) locker	cm	cm	cm
h) your partner's height	m	m	m
i) your teacher's height	m	m	m
j) bookshelf	cm	cm	cm
k) bulletin board	cm	cm	cm
l) blackboard eraser	cm	cm	cm
m)			
n)			
o)			

NOTE: m, n, and o, choose any object in the room.

- II. A. Estimate rather than measure the following segment lengths to the nearest whole unit suggested and check by measuring.

1. cm _____

2. mm _____

3. m _____

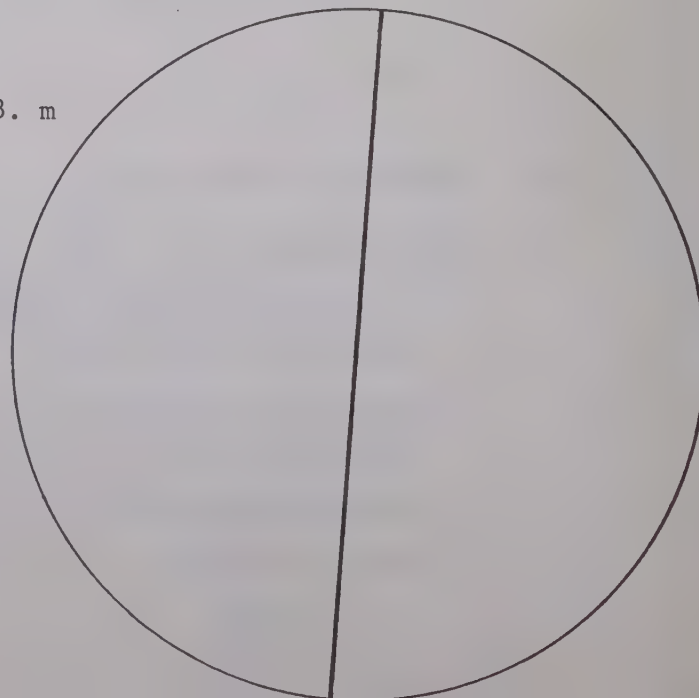
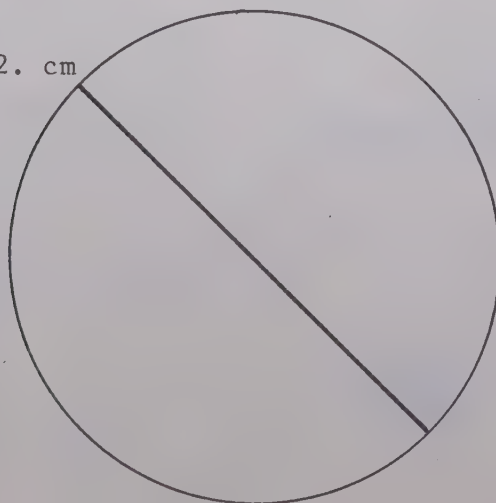
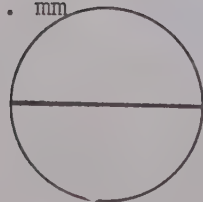
4. dam _____

- B. Estimate the diameter of the following circles to the nearest unit suggested.

3. m

2. cm

1. mm

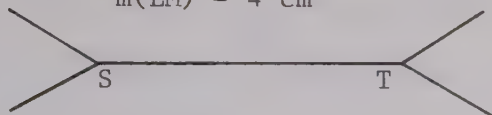


EXERCISES:

OBJECTIVE NO. 7

II. C. 1) L _____ M

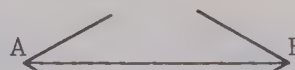
$$m(\overline{LM}) = 4 \text{ cm}$$



Using $m(\overline{LM})$ as a guide,
estimate $m(\overline{ST})$ in mm.

2) X _____ Y

$$m(\overline{XY}) = 35 \text{ mm}$$



Using $m(\overline{XY})$ as a guide,
estimate $m(\overline{AB})$ in cm.

- D. 1. What would be the measure of an ant's egg?
 2. How long would a gopher be from head to tail?
 3. How long is the High Level Bridge?
 4. Instead of a 25" TV screen, what would we now call it?
- E. Estimate the length of each of the following in centimetres - check by measuring.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

10. _____

III. A. 1. Use your metre stick and name two common objects that are about:

- a) one metre in length eg. you could use:
 b) one decimetre in length (i) width of your finger
 c) one centimetre in length (ii) length of your book
 d) one millimetre in length

2. Estimate the length of other objects in the room that you have not measured. Then check by measuring. Copy and complete the chart.

	Estimate	Measure
1. Height of your desk		
2. Length of the room		
3. Width of your desk		
4. Your height		

- B. 1. Is the length of an open newspaper equal to, less than, or greater than a metre? Check by measuring.
2. You wish to mark out a one kilometre track in the gym. Estimate the number of times you would have to go around the gym to run one kilometre. Check by using a trundle wheel.

EXERCISES:

OBJECTIVE NO. 8

I. Measure each of the following segments, use the indicated units, then find the sum or difference.

1. $\overline{RI} \xrightarrow{\text{(cm)}} \overline{I} \xrightarrow{\text{(mm)}} \overline{CK}$
 $m(\overline{RI}) + m(\overline{CK}) = \underline{\hspace{2cm}} \text{ (mm)}$

2. $\overline{DA} \xrightarrow{\text{(mm)}} \overline{A} \xrightarrow{\text{(mm)}} \overline{VE}$
 $m(\overline{DA}) + m(\overline{VE}) = \underline{\hspace{2cm}} \text{ mm}$

3. $\overline{JA} \xrightarrow{\text{(dm)}} \overline{A} \xrightarrow{\text{(cm)}} \overline{CK}$
 $m(\overline{JA}) - m(\overline{CK}) = \underline{\hspace{2cm}} \text{ cm}$

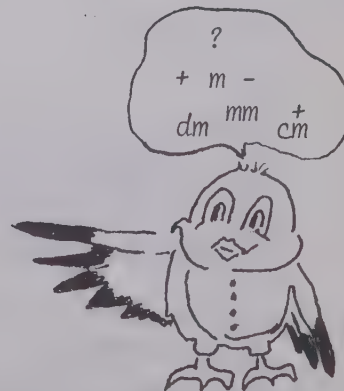
4. $\overline{JO} \xrightarrow{\text{(mm)}} \overline{O} \xrightarrow{\text{(cm)}} \overline{AN}$
 $m(\overline{JO}) - m(\overline{AN}) = \underline{\hspace{2cm}} \text{ cm}$

5. $\overline{MA} \xrightarrow{\text{(cm)}} \overline{A} \xrightarrow{\text{(mm)}} \overline{RI} \xrightarrow{\text{(dm)}} \overline{ON}$
 $m(\overline{MA}) + m(\overline{RI}) + m(\overline{ON}) = \underline{\hspace{2cm}} \text{ mm}$

II. Perform the operations of addition and subtraction.

SI

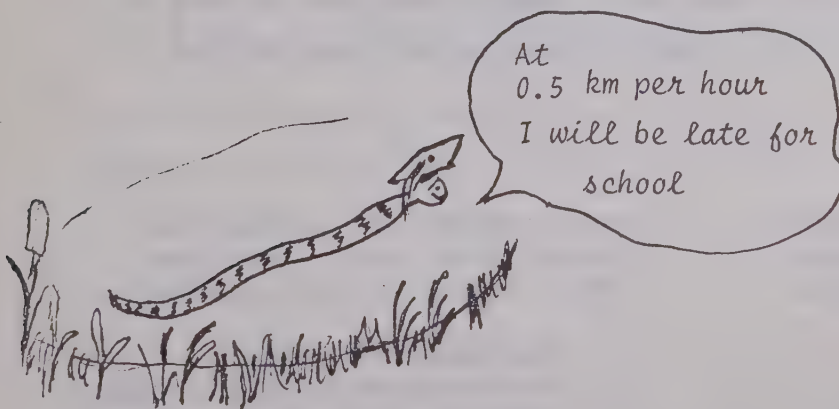
1. $6.4 \text{ cm} + 2.3 \text{ cm} = \underline{\hspace{2cm}} \text{ cm}$
2. $13.5 \text{ mm} - 2.5 \text{ mm} = \underline{\hspace{2cm}} \text{ mm}$
3. $7.6 \text{ m} + 2 \text{ m} = \underline{\hspace{2cm}} \text{ m}$
4. $8 \text{ dm} - 4 \text{ dm} = \underline{\hspace{2cm}} \text{ dm}$
5. $3.8 \text{ cm} + 5.64 \text{ cm} + 2.1 \text{ cm} = \underline{\hspace{2cm}} \text{ cm}$
6. $5.2 \text{ cm} - 3.64 \text{ cm} + 2.1 \text{ cm} = \underline{\hspace{2cm}} \text{ cm}$
7. $55 \text{ mm} + 8 \text{ cm} = \underline{\hspace{2cm}} \text{ cm}$
8. $9.3 \text{ cm} + .2 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$
9. $100 \text{ mm} + .2 \text{ cm} = \underline{\hspace{2cm}} \text{ cm}$
10. $5.3 \text{ cm} + 2.6 \text{ mm} + 12 \text{ mm} = \underline{\hspace{2cm}} \text{ cm}$



EXERCISES:

OBJECTIVE NO. 9

1. Each basketball uniform needs 1.5 metres of material. How many metres of material are needed for 11 uniforms?
2. If infrared radiation in sunlight has a wave length of 0.0925 cm, what is the wavelength in metres?
3. How many metres does it take to enclose a four sided pen whose sides are 1.2 m, 0.0013 km, 140 cm, and 1400 mm?
4. Alfie saw exactly the same wire in two different stores. Store A sold 15 metres of wire for \$33.90. Store B sold 1400 cm for \$28.42. Which store sells the cheaper wire?
5. The Super ALGX goes 200 km per hour. If the distance is 320 km from Edmonton to Calgary, how long would it take to make this trip?
6. Don is building a book case two metres high. He is using two rows of bricks and therefore needs four metres of bricks. If each brick is four centimetres high, how many bricks does he need?
7. A gardener is planting five straight rows of peas. Each row is 1 000 centimetres long. If he plants three seeds per centimetre, how many seeds are needed for all five rows?
8. If each sheet of page in a book is 0.001cm thick, how many pages are needed to make a book 0.2 cm thick?
9. Maurice's hair is 2 centimetres long. His hair grows 1 centimetre every two months. How long will it take until his hair is 0.1metres long?
10. If a snake slithers through a slough at the rate of 0.5 km per hour, how far will he go in 2.5 hours? How long would it take him to go 1 000 cm?
11. If the price of measuring device is determined by the length of the device, how much does a metre stick cost when a 30 cm metric ruler costs 30 cents?



EXERCISES

OBJECTIVE NO. 10

I.

1 mg	1 g	1 kg	1 Mg or 1 t
_____ kg	_____ kg	_____ kg	_____ kg
_____ hg	_____ hg	_____ hg	_____ hg
_____ dag	_____ dag	_____ dag	_____ dag
_____ g	_____ g	_____ g	_____ g
_____ dg	_____ dg	_____ dg	_____ dg
_____ cg	_____ cg	_____ cg	_____ cg
_____ mg	_____ mg	_____ mg	_____ mg

II.

1 ml	1 cl	1 dl	1 l	1 dal	1 hl	1 kl
_____ kl	_____ kl	_____ kl	_____ kl	_____ kl	_____ kl	_____ kl
_____ hl	_____ hl	_____ hl	_____ hl	_____ hl	_____ hl	_____ hl
_____ dal	_____ dal	_____ dal	_____ dal	_____ dal	_____ dal	_____ dal
_____ l	_____ l	_____ l	_____ l	_____ l	_____ l	_____ l
_____ dl	_____ dl	_____ dl	_____ dl	_____ dl	_____ dl	_____ dl
_____ cl	_____ cl	_____ cl	_____ cl	_____ cl	_____ cl	_____ cl
_____ ml	_____ ml	_____ ml	_____ ml	_____ ml	_____ ml	_____ ml

III. WHAT SIZE IN SI?

A. If you are to buy the following items after Canada adopts the SI units, what size would you buy?

1. 3 qts. of milk.
2. 5 lbs. of potatoes.
3. 100 ft. of wax paper.
4. 6 10 oz. cokes.
5. 3 lbs. of hamburger.
6. 1 pt. of ice cream.

B. Some products have already converted to SI units. Find out the SI sizes of the following.

1. Toothpaste (3 sizes).
2. Dry breakfast cereal (3 sizes).
3. Large jar of instant coffee.
4. Large bottle of shampoo.
5. Small can of hair spray.

1. Explain two reasons why you need standardized measurement.
2. Give two examples of measurement as a comparison.
3. 55 cm can be expressed as ____ m, or ____ dm, or ____ mm.
4. What are the symbols for the following and what relationship are they to the metre?
 - a. millimetre ____, ____
 - b. centimetre ____, ____
 - c. kilometre ____, ____
5. Convert each of the following to the indicated unit.
 - a. 100 m = ____ km
 - b. 88 cm = ____ km
 - c. 592 cm = ____ m
 - d. 0.08 km = ____ m
 - e. 592 mm = ____ m
6. With a metric ruler measure each of the following segments in dm, cm and mm.
 - a. A _____ B ____ dm ____ cm ____ mm
 - b. C _____ D ____ dm ____ cm ____ mm
 - c. E _____ F ____ dm ____ cm ____ mm
7. Which metric ruler would be more accurate? A metric ruler with mm only on it, or one with just dm on it to measure the length of a piece of chalk?
8. Perform the operations of addition and subtraction.
 - a. $5.8 \text{ cm} + 2.3 \text{ cm} = \text{____ cm}$
 - b. $8 \text{ dm} + 4 \text{ dm} = \text{____ dm}$
 - c. $8.8 \text{ cm} + 5.64 \text{ cm} + 2.1 \text{ cm} = \text{____ cm}$
 - d. $67 \text{ mm} + 7 \text{ cm} = \text{____ cm}$
 - e. $9.3 \text{ cm} - 2 \text{ mm} = \text{____ mm}$
9. How many metres does it take to enclose a four-sided pen whose sides are 2.2 m, 0.0023 km, 140 cm, and 2400 mm?
10. Bob is running down the block. Each of his strides is 85 cm long. How many strides does Bob take if the block is 190 m long? (200)

LEVEL 7

UNIT VI

EXPONENTS

UNIT VI - EXPONENTS

CONCEPT CHECK LIST

When you have completed this unit, you should be able to:

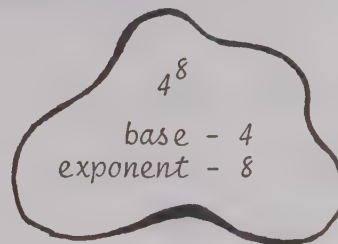
1. Define the terms: base, power, exponent, square, cubes.
2. Write powers. (base and exponents whole numbers)
3. Write the standard name of a power.
4. Write the expanded form of whole numbers in exponential notation.
5. Write the expanded form of decimals in exponential notation.

EXERCISES:

OBJECTIVE NO. 1

1. For each of the powers given below, name the base.

a. 10^8 b. 3^4 c. 6^7 d. 13^5 e. 99^6



2. Name the exponent of each of the powers in #1.

3. Write a word description for each of the following powers:

a. 10^8 - ten to the eighth power.

b. 3^4 c. 6^7 d. 13^5 e. 99^6

4. Write each of the following in exponential form:

a. seventeen cubed - 17^3

f. eight exponent two

b. one hundred squared

g. eight squared

c. fifteen exponent four

h. thirty-six cubed

d. fifty-two to the power twelve

i. ten to the eleventh power

e. five to the fifth power

j. seven exponent nine

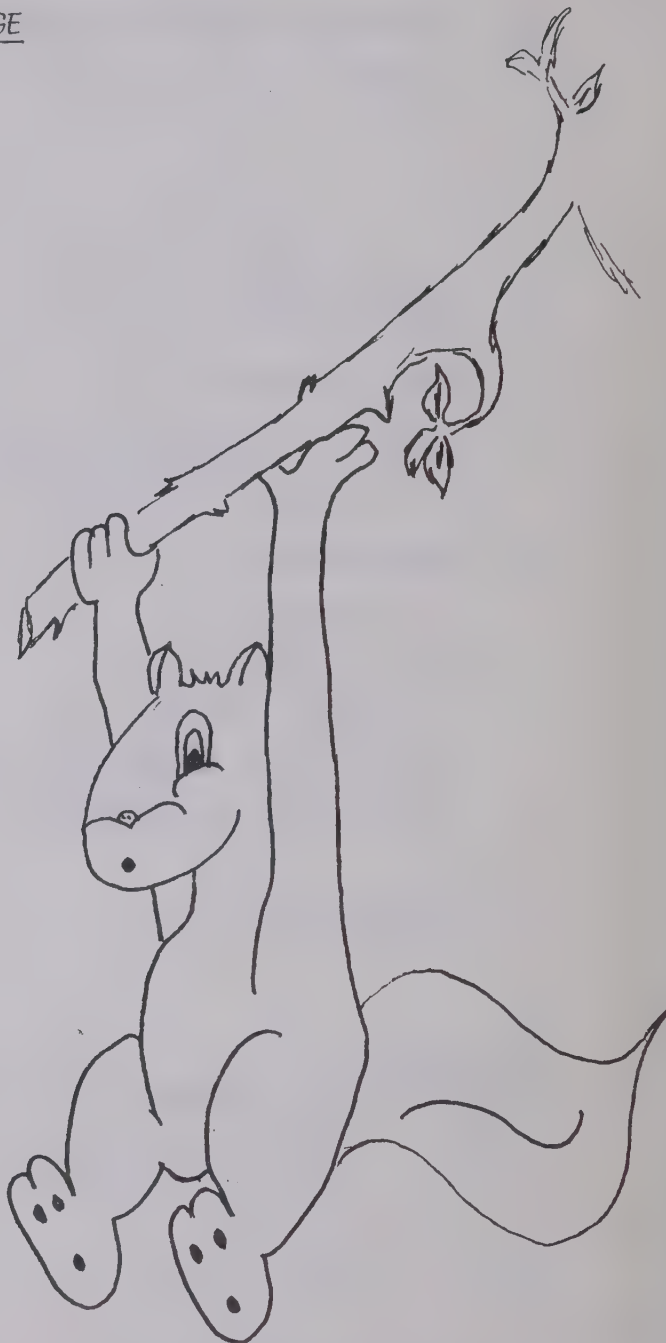
5. Complete the chart.

Exponential form	Base	Exponent	Word Description	Factored form
18^3	18	3	Eighteen to the power of three	$18 \times 18 \times 18$
			Sixty-six squared	
				$10 \times 10 \times 10$
17^4				
				$38 \times 38 \times 38 \times 38 \times 38$
	12	2		
			Five to the fourth power	

FLAGGING PAGE

Perform the indicated operations.

1. $724 + 3\,468 =$
2. $822 \div 6 =$
3. $6\,428 - 389 =$
4. $6 + 7 \times 2 - 7 =$
5. $(6 \times 8) - (3 \times 4) =$
6. $18 \times 3 \times 0 =$
7. $468 \div 26 =$
8. $124 \times 32 \div 8 =$
9. $28 - 3 \times 2 + 4 \times 6 =$
10. $2\,476 - 1\,805 + 201 =$
11. $6\,000 - 3\,875 =$
12. $486 + 21 - 105 =$
13. $6\,472 \times 13 =$
14. $(9 \times 3 - 3) \div 8 + 7 =$
15. $9\,072 \div 72 =$
16. $2 \times 2 \times 2 \times 2 \times 2 =$
17. $7 \times 7 \times 7 \times 7 =$
18. $5 \times 5 \times 5 =$
19. $27 - 2 \times 2 \times 2 =$
20. $6 \times 6 \times 6 - 5 \times 5 + 3 \times 3 \times 3 =$



EXERCISES:

OBJECTIVE NO. 2

1. Show the factored form and find the standard numeral.

a. $15^2 = 15 \times 15 = 225$

b. 9^3

e. 33^3

h. 5^6

c. 2^7

f. 1^8

i. 258^2

d. 6^5

g. 12^4

j. 19^4

2. *What's the difference between a teacher and a train?*

To find the answer to this question, find the standard numeral for each power in questions 1 to 15. Then use the key at the bottom to get a letter from the standard numeral. Place this letter in any blank that has its question number below it.

e.g. #8. $11^2 = \underline{\quad}$ Since $11^2 = 121$, and 121 is paired with n in the key, we put an n whenever we see an 8 (question number) below the blank, as shown.

1. $2^5 = \underline{\quad}$

6. $10^2 = \underline{\quad}$

11. $5^3 = \underline{\quad}$

2. $3^2 = \underline{\quad}$

7. $3^4 = \underline{\quad}$

12. $6^3 = \underline{\quad}$

3. $10^4 = \underline{\quad}$

8. $11^2 = \underline{121}$

13. $3^5 = \underline{\quad}$

4. $8^2 = \underline{\quad}$

9. $7^2 = \underline{\quad}$

14. $6^2 = \underline{\quad}$

5. $5^2 = \underline{\quad}$

10. $3^3 = \underline{\quad}$

15. $2^3 = \underline{\quad}$

243 8 49 9 10 000 36 32 81 121 64
w o r c e y a m n g

216 25 27 100 125
u h s i t

1 11 3 1 2 5 3 9 10 1 14 10 11 5 9 15 13 15 12 11

14 15 12 9 4 12 7 1 11 9 1 6 8 10 1 14 10 2 5 15 15
2 5 15 15

EXERCISES:OBJECTIVE NO. 2

3. Match the standard numeral in Column II with the exponential form in Column I by placing the appropriate letter under Column II in the blank supplied with Column I.

Column I

_____ 8^3

_____ 3^5

_____ 10^{10}

_____ 20^4

_____ 4^6

_____ 101^2

_____ 2^8

Column II

a. 160 000

b. 256

c. 243

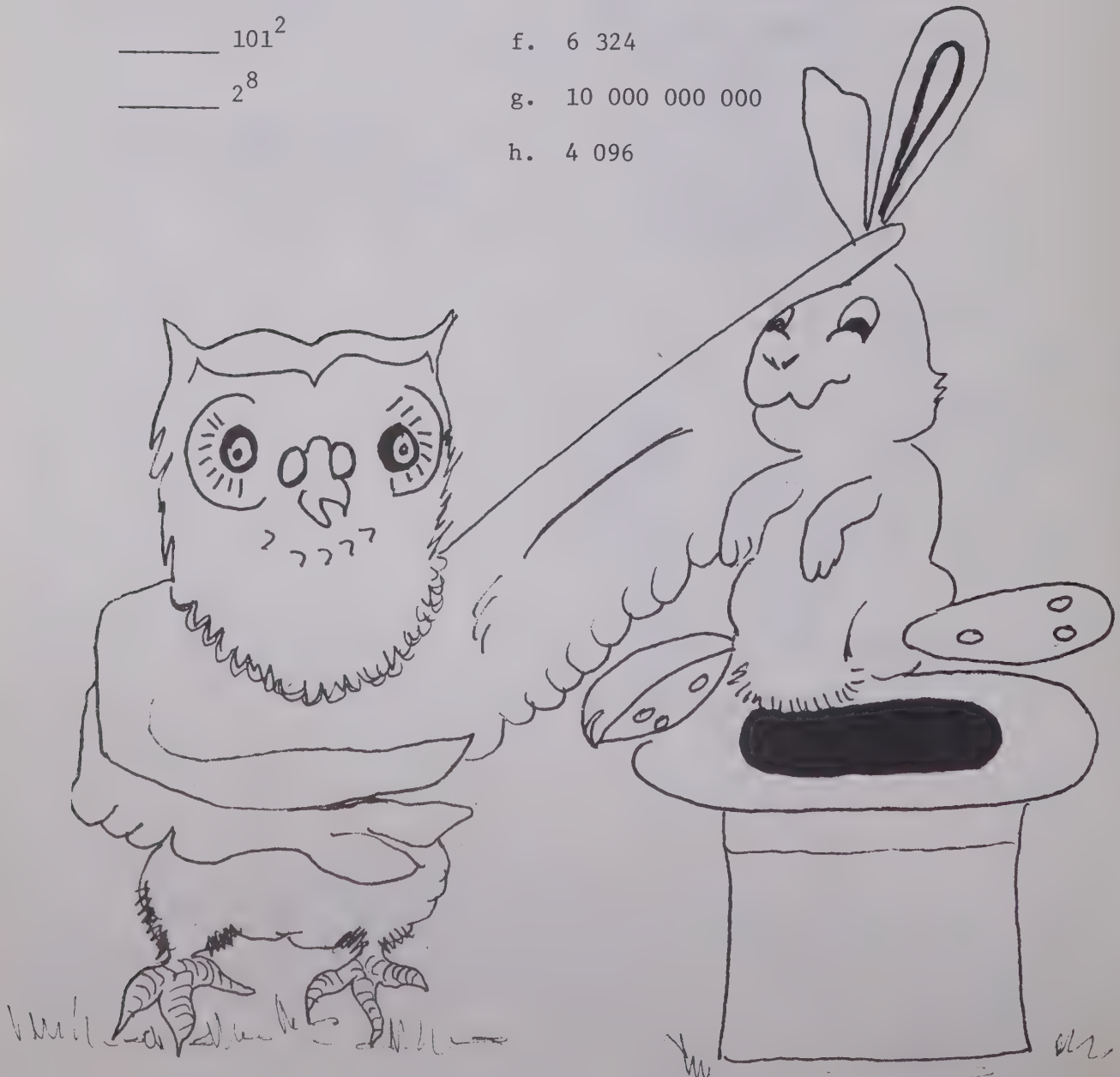
d. 10 201

e. 512

f. 6 324

g. 10 000 000 000

h. 4 096



EXERCISES:

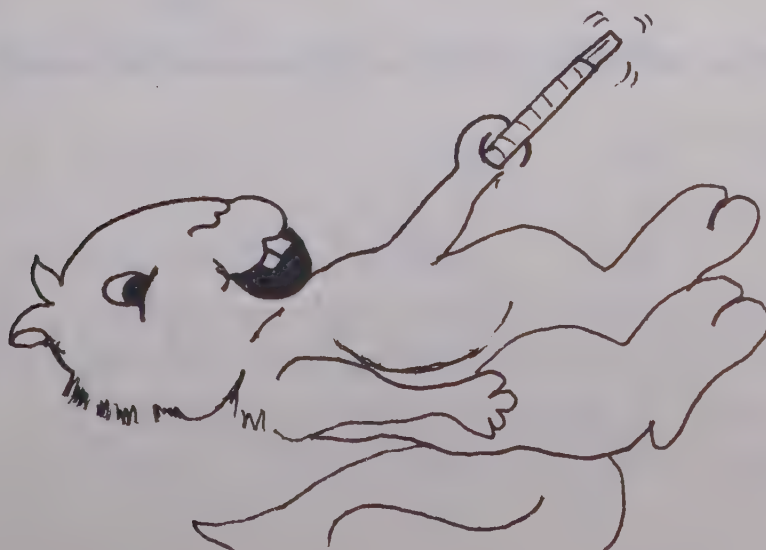
OBJECTIVE NO. 2

4. It is possible to express the integers from 1 to 25 as the sum of not more than four square numbers. A chart has been prepared below and the first few sums are done for you. Complete the chart. For some numbers, more than one combination is possible.

A square number
is a number that
is a perfect square.

e.g. 1, 4, 9, 16,
25, etc.

No.	Sum of Square Numbers	Sum of Square Numbers in Exponent Form	No.	Sum of Square Numbers	Sum of Square Numbers in Exponent Form
1	1	1^2	14		
2	$1 + 1$	$1^2 + 1^2$	15		
3	$1 + 1 + 1$	$1^2 + 1^2 + 1^2$	16		
4	4	2^2	17		
5	$4 + 1$	$2^2 + 1^2$	18		
6			19		
7			20		
8			21		
9			22		
10			23		
11			24		
12			25		
13					



EXERCISES:

OBJECTIVE NO. 3

1. Complete the following chart for numeral 862.345

Decimal Numeral	8	6	2 •	3	4	5
Place Value						$\frac{1}{1\ 000}$
Value of each digit				$3 \times \frac{1}{10}$		
Factored form showing base ten	$8 \times 10 \times 10$					
Exponential Form		6×10^1				
Expanded Form						

2. Write the expanded form using exponential form for each of the following:

a. 3 476.329

d. 1.360 8

b. 5 031.067

e. 0.409 62

c. 90 084.803 2

f. 0.000 1

Reminder:

$$10^0 = 1 ;$$

$$10^1 = 10$$

3. Write decimal numerals for the following numerals.

a. $(4 \times 10^2) + (3 \times 10^1) + (7 \times 10^0) + (8 \times \frac{1}{10^1}) + (6 \times \frac{1}{10^2}) + (3 \times \frac{1}{10^3})$

b. $(6 \times 10^3) + (0 \times 10^2) + (8 \times 10^1) + (2 \times 10^0) + (0 \times \frac{1}{10^1}) + (4 \times \frac{1}{10^2})$

c. $(1 \times 10^4) + (3 \times 10^3) + (9 \times 10^2) + (0 \times 10^1) + (4 \times 10^0) + (5 \times \frac{1}{10^1}) + (0 \times \frac{1}{10^2}) + (8 \times \frac{1}{10^2})$

d. $(4 \times \frac{1}{10^1}) + (8 \times \frac{1}{10^2}) + (0 \times \frac{1}{10^3}) + (7 \times \frac{1}{10^4})$

e. $(9 \times 10^4) + (0 \times 10^3) + (0 \times 10^2) + (4 \times 10^1) + (8 \times 10^0) + (0 \times \frac{1}{10^1}) + (8 \times \frac{1}{10^2})$

f. $(0 \times \frac{1}{10^1}) + (0 \times \frac{1}{10^2}) + (4 \times \frac{1}{10^3}) + (8 \times \frac{1}{10^4}) + (5 \times \frac{1}{10^5})$

REVIEW EXERCISES:

OBJECTIVES NO. 1 - 3

1. For each power listed below, name the base and the exponent:

- a. 126^3 base _____ exponent _____
 b. 15^0 base _____ exponent _____
 c. 6^6 base _____ exponent _____

2. Indicate the factored form.

- a. $5^7 =$ _____
 b. 100^3 _____
 c. $12^4 =$ _____
 d. $10^0 =$ _____
 e. $3^4 =$ _____
 f. $6^2 =$ _____

3. Write exponential form for:

- a. seven cubed _____
 b. the twelfth power of ten _____
 c. one thousand squared _____
 d. ninety exponent seven _____

4. Write a word description for each of the following powers:

- a. 8^5
 b. 10^0
 c. 21^3
 d. 46^2

5. Write the standard numeral for each of the following:

- a. 143^2 _____
 b. 5^3 _____
 c. 1^{10} _____
 d. 10^4 _____
 e. 10^0 _____
 f. 10^1 _____

6. Write the expanded form for the following decimal numerals:

- a. 612.35
 b. 212
 c. 1 020.406

7. Write decimal numerals for:

- a. $(6 \times 10^3) + (5 \times 10^2) + (0 \times 10^1) + (3 \times 10^0) + (0 \times \frac{1}{10^1}) + (9 \times \frac{1}{10^2})$
 b. $(9 \times 10^1) + (6 \times 10^0) + (7 \times \frac{1}{10^1}) + (2 \times \frac{1}{10^2}) + (4 \times \frac{1}{10^3}) + (8 \times \frac{1}{10^4})$

8.

MATCH 'EM UP!

Below are two blocks of sixteen rectangles. The upper block of rectangles contains exponential form while the lower block contains standard numerals. You are to calculate the standard numeral for each power in the top block, and find the answer in the bottom block. When you have done this, transfer the word from the corresponding top rectangle to the appropriate bottom rectangle. That is where we get the title "Match 'Em Up".

If you do this correctly, the words in the bottom block should form a corny saying that is bound to be an earful!

EXAMPLE: Since $6^4 = 6 \times 6 \times 6 \times 6 = 1\,296$, the word "what" is placed in the rectangle having the number 1 296.

4^3 ONLY	8^3 TO	2^5 US	10^4 DROP
3^4 BETWEEN	6^4 WHAT	30^3 SAY	15^3 EAR
7^4 OVER	4^5 ONE	9^3 THE	6^5 BLOCK
10^0 DID	18^2 A	5^1 OTHER	6^2 THERE'S

1 296 WHAT	1	1 024	3 375
27 000	512	729	5 ?
10 000	2 401	36	64
324	7 776	81	32

LEVEL 7

UNIT VII

GEOMETRY

UNIT VII - GEOMETRY

CONCEPT CHECK LIST

When you have completed this unit, you should be able to:

SLIDE

1. Use the slide to obtain an image of a polygon.
2. Use slide notation correctly.
3. Use the slide to show two figures congruent.

REFLECTION (FLIP)

1. Locate the reflection image of a polygon, given the mirrorline.
2. Locate the mirror line and the mirror image of a polygon.
3. Determine if congruent polygons were produced by reflection.
4. Obtain all the mirror symmetries for a polygon.

ROTATION (TURN)

1. Obtain the rotation image of a polygon.
 $(\frac{1}{4} T, \frac{1}{2} T, \frac{3}{4} T, \text{ cw, ccw})$
2. Use the correct notation for the rotation image.
3. Find the turn symmetries of a given figure.
4. Determine if congruent polygons were produced by a turn.
5. Complete an Invariance Table for the slide, reflection and half-turn.

POLYGONS

1. Classify polygons according to the number of sides.
2. Classify triangles by the sides, using the number of lines of symmetry.
3. Classify quadrilaterals (parallelogram, rectangle, square, rhombus)
4. List the properties of these quadrilaterals: sides, angles, diagonals.

CIRCLE

1. Identify the parts of a circle.
2. List the properties of a circle: diameters, radii, center.

EXERCISES:

OBJECTIVE NO. 1

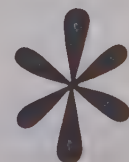
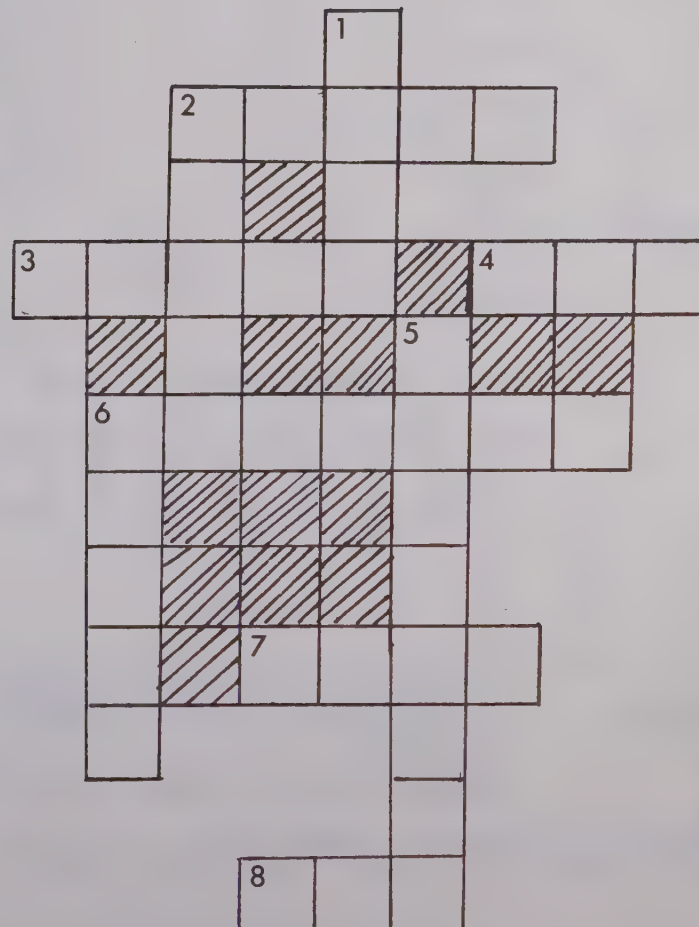
A. CROSSWORD PUZZLE: Use the clues below to complete the puzzle.

DOWN

1. Many points all in a row.
2. A very large flat surface.
5. The topic you are about to study.
6. The set of all possible points in a universe.

ACROSS

2. A very tiny place, usually written \cdot
3. Something that covers everything. (outer _____)
4. Half a line.
6. The part of a line between two points (symbol \overline{AB})
7. Two lines _____ at a point.
8. The object whose symbol is $\circ \xrightarrow{AB}$.



B. FIND THE HIDDEN MESSAGE

First: Match the symbols or definitions in column 2 with the terms in column 1, by placing a letter of the Greek Alphabet in the appropriate blank.

Second: Place the Greek letters into the corresponding boxes.

Third: Change each Greek letter to a letter from the English Alphabet using the decoder key. Then replace each number in the message by an English letter and you will find the HIDDEN MESSAGE.

<u>COLUMN 1</u>	<u>COLUMN 2</u>
1. Ray \triangle	Γ - 90°
2. Congruent to _____	Θ - $\ell_1 \parallel \ell_2$
3. Angle _____	Σ - \overline{AB}
4. Line _____	Φ - Infinite
5. Parallel to _____	Ψ - Dot
6. Segment _____	Ω - 3 points
7. Space _____	Π - \cong
8. Point _____	\triangle - \overrightarrow{CD}
9. Right Angle _____	\angle - \overleftrightarrow{PT}
10. Plane _____	\times - \angle ANG

1	2	3	4	5	6	7	8	9	10
\triangle									

Decoder Key:

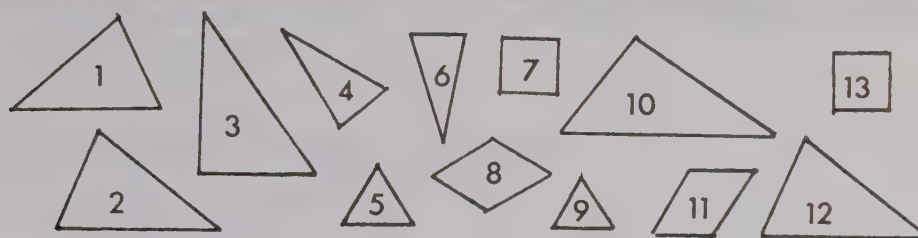
Π	Ψ	\triangle	\angle	\times	Ω	Θ	Γ	Σ	Φ
K	M	O	Y	I	S	T	G	E	R

Message:

9 6 1 8 6 5 7 4 3 10 9 7 6 6 2 5 1 8 6

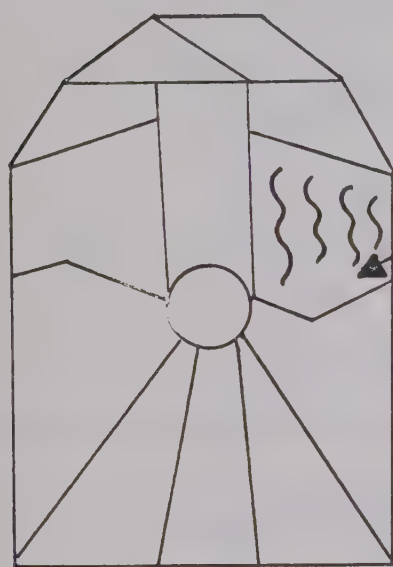
EXERCISES:OBJECTIVE NO. 2

I. Select by tracing the pairs of congruent figures.

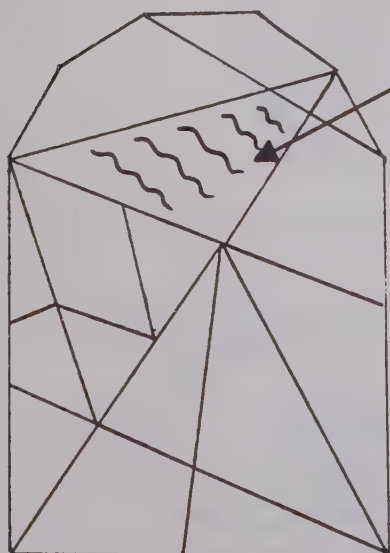


II. DECORATIVE WINDOWS

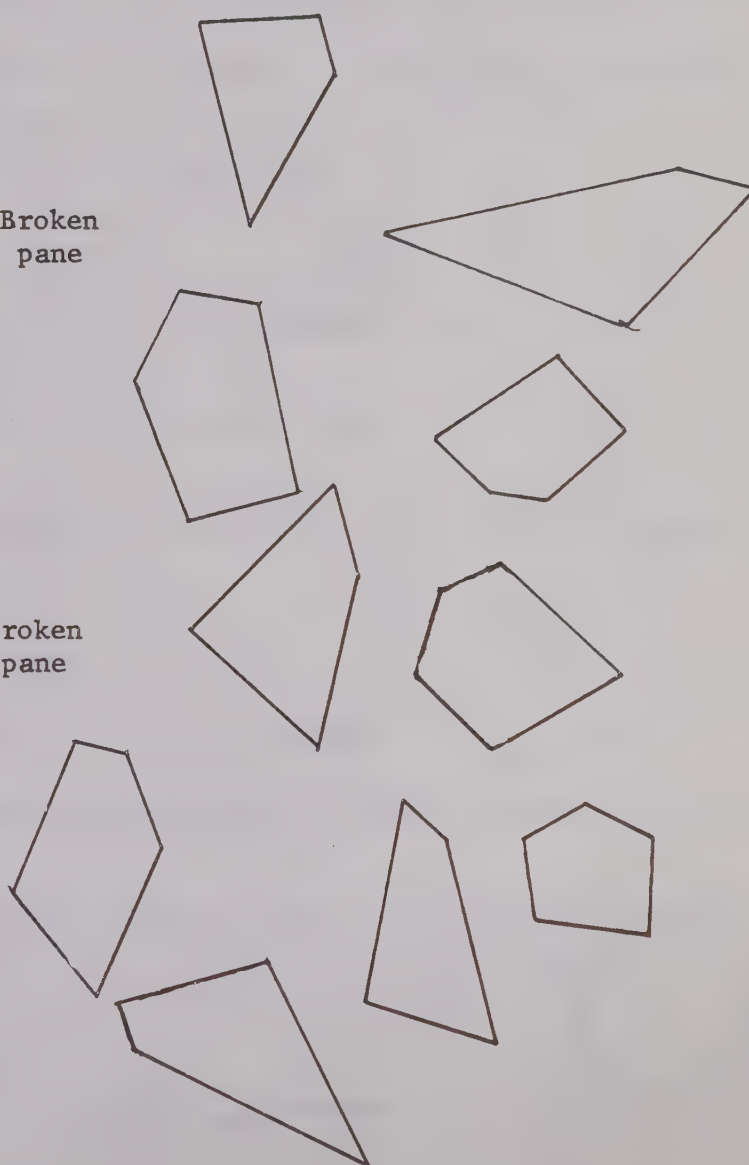
A glass pane is to be replaced in each of the two window frames below. Draw a line joining the pane in the frame and the polygon at the right which would fit it.



Broken
pane



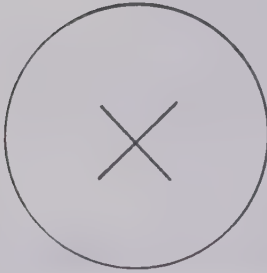
Broken
pane



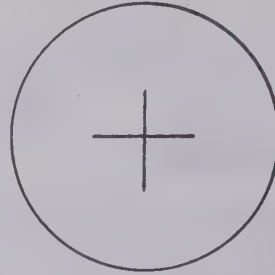
COLOR THE WINDOW: Color each polygon region so that no two polygons with the same color touch. Use as few colors as possible.

III. Determine whether the following sets of figures are congruent, using the method of tracing.

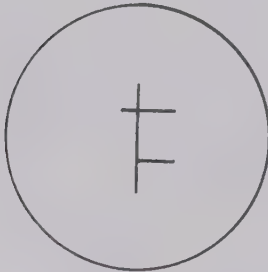
a)



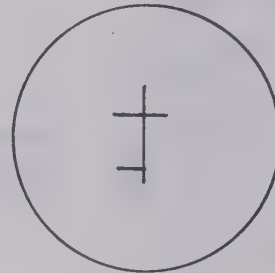
Answer _____



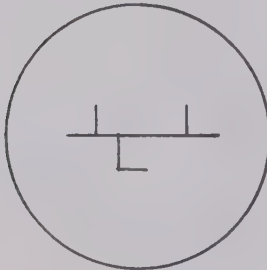
b)



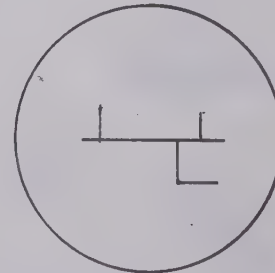
Answer _____



c)



Answer _____



d)

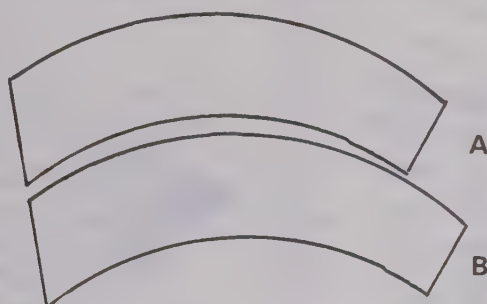


Answer _____

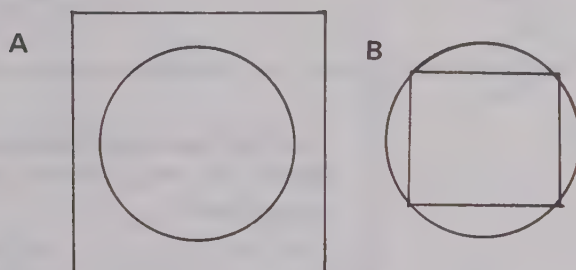


IV. In doing these exercises, be sure to test each of your answers.
You may be surprised.

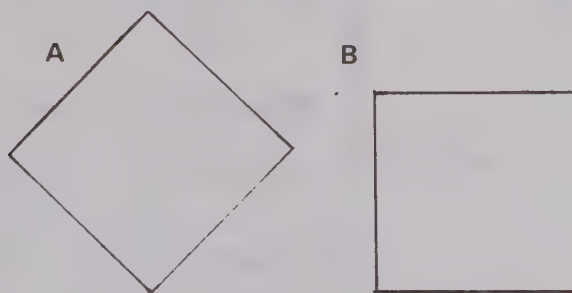
1. Is figure "A" congruent to figure "B"?



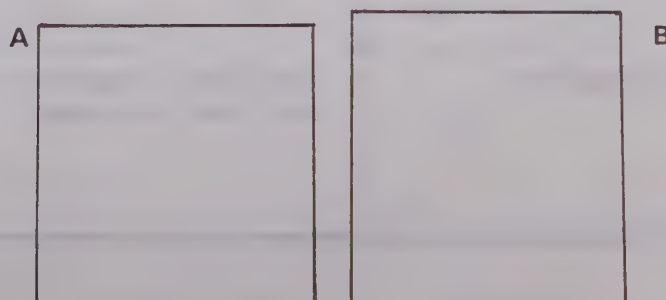
2. Is the circle in figure "A" congruent to the circle in figure "B"?



3. Is square "A" congruent to square "B"? If not, which is larger?

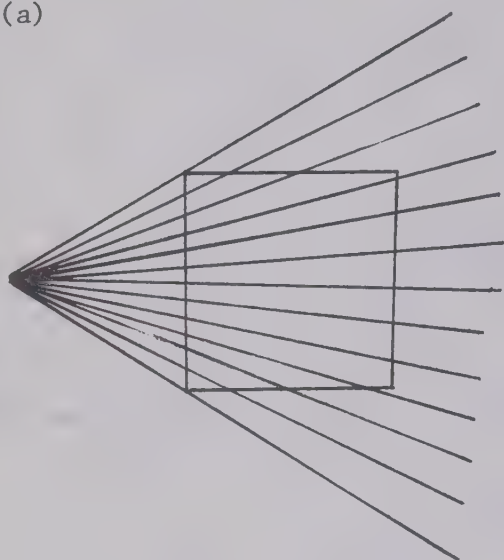


4. A square must have four congruent sides. One of these figures is a square. The other is not. Which is the square?



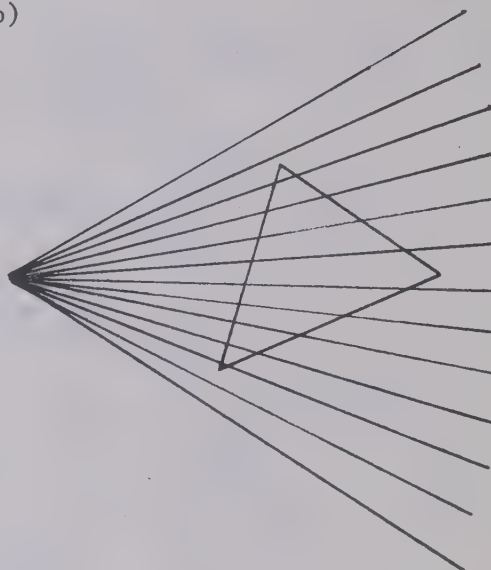
V. Checking for congruence using optical illusions.

(a)



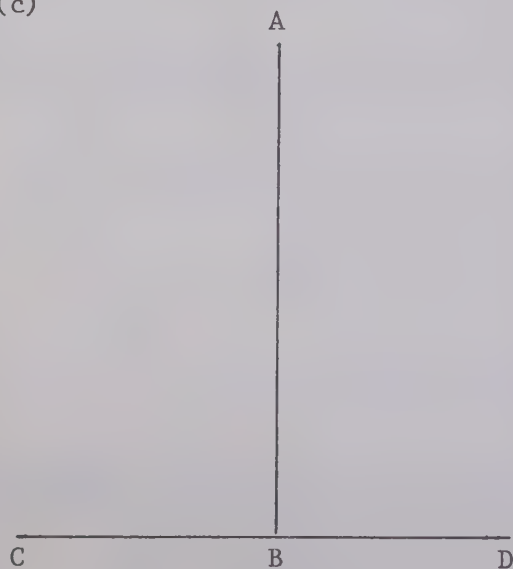
Is the figure a square?
Are the sides of the
figure congruent?

(b)



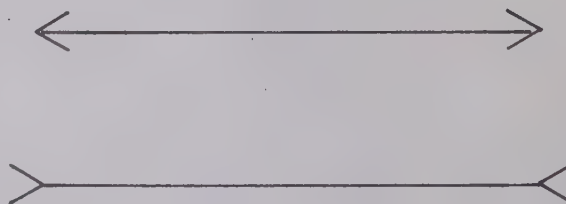
Is this an equilateral triangle?
Check to see if the sides are
congruent.

(c)



Are these two line segments
congruent?

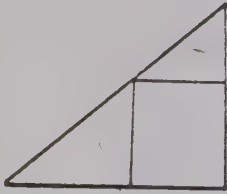
(d)



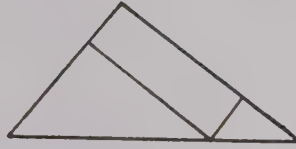
Are these segments parallel?
Are they congruent?

VI. Choose the pairs in each row that are equal in all respects (congruent). Check your choices any way you want. Symbols for congruent are \leftrightarrow , \cong .

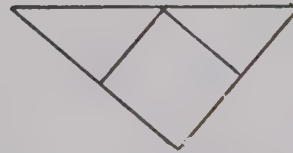
1.



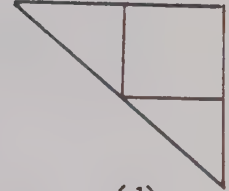
(a)



(b)

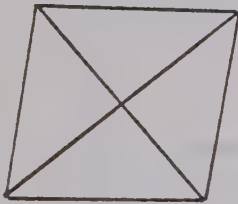


(c)

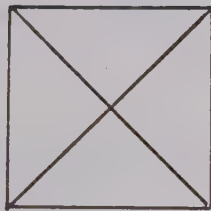


(d)

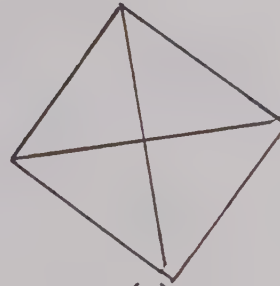
2.



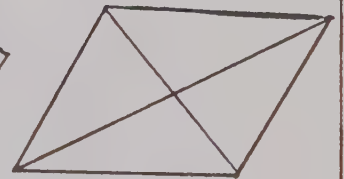
(a)



(b)



(c)



(d)

3.



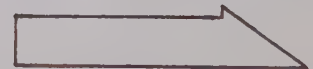
(a)



(b)



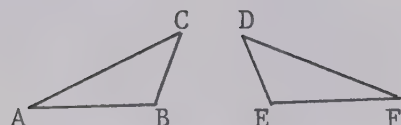
(c)



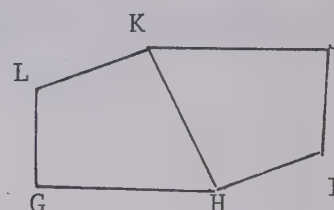
(d)

- VII. (a) By tracing, check which of the following pairs of polygons are congruent, you may have to flip your tracing paper over.
- (b) Construct a "goes to" table for each pair of congruent figures and name four corresponding congruent parts for each pair.

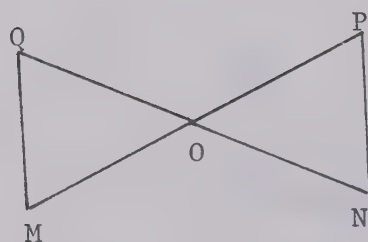
1.



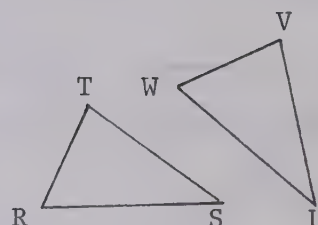
2.



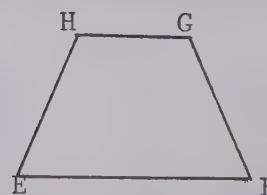
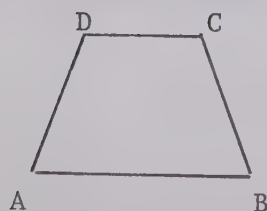
3.



4.



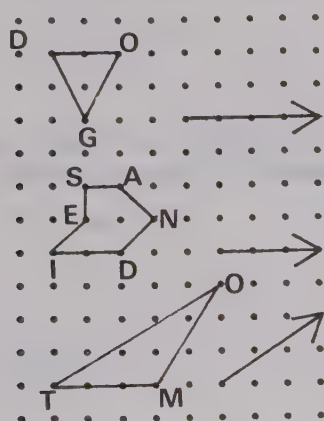
5.



REQUIREMENTS OF A SLIDE

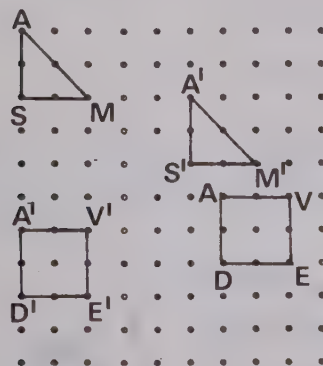
1. Draw each polygon on your dot paper. Draw a slide arrow as shown. Draw the image of each. Label the image correctly.

e.g. DOG and $D'O'G'$



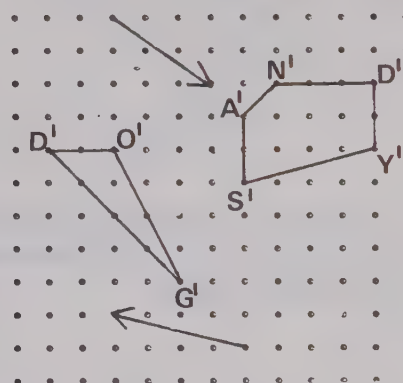
Is the distance that D moved to become D' the same as the distance from O to O' and G to G' ?

2. Draw each polygon on your dot paper. Draw a slide arrow to indicate the motion.

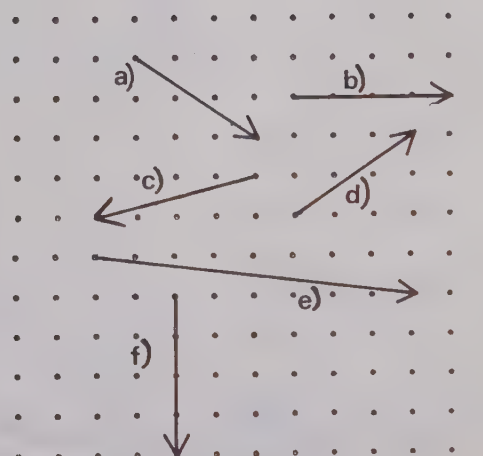


Can you draw more than one slide arrow to show these slides?

3. Draw each image on your dot paper. Draw the original polygon.



- 4.



Describe each slide arrow above using slide notation. The first is done as an example.

(a) (3R, 2D)

A SLIDE NEEDS

1. An original
2. A slide arrow
3. An image

5. Draw a slide arrow on your dot paper for each of the following:

(a) $(3L, 0)$

(d) $(5L, 2U)$

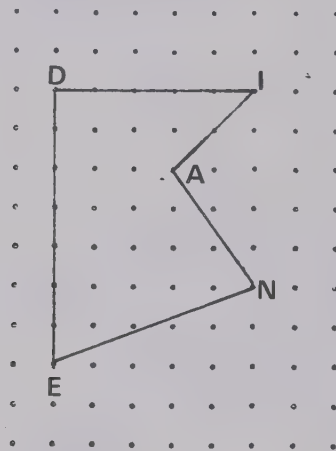
(b) $(2R, 4U)$

(e) $(0, 2U)$

(c) $(3R, 3D)$

(f) $(2L, 4D)$

6. Draw the polygon in the diagram on your dot paper and draw image for each of the following. Use the original for the starting point for each slide.



(a) $(2R, 3D)$

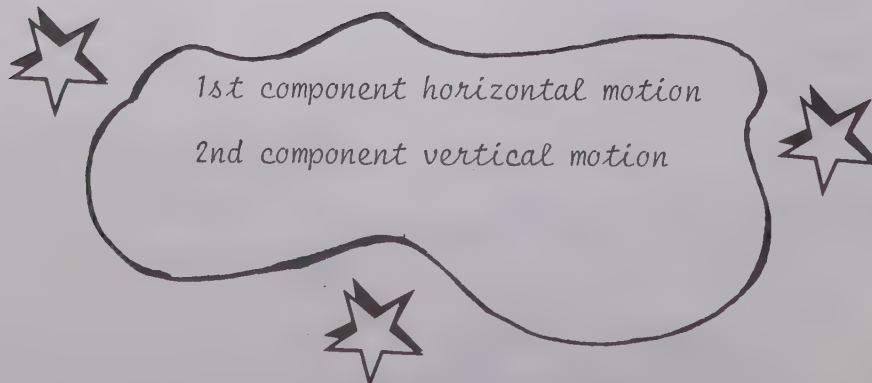
(d) $(5L, 0)$

(b) $(2L, 3U)$

(e) $(1L, 3U)$

(c) $(0, 4D)$

(f) $(2R, 4U)$



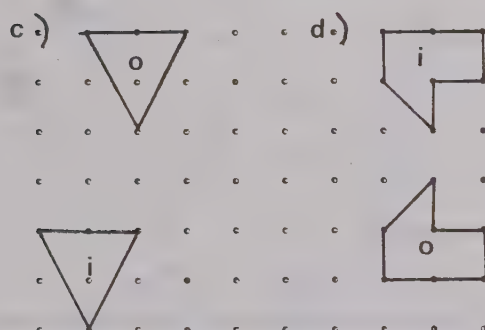
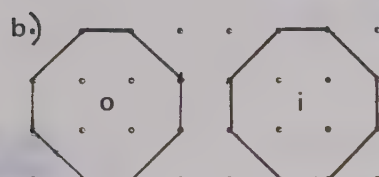
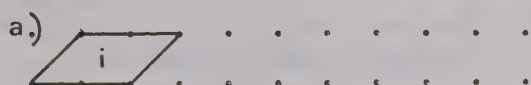
EXERCISES:

OBJECTIVE NO. 4

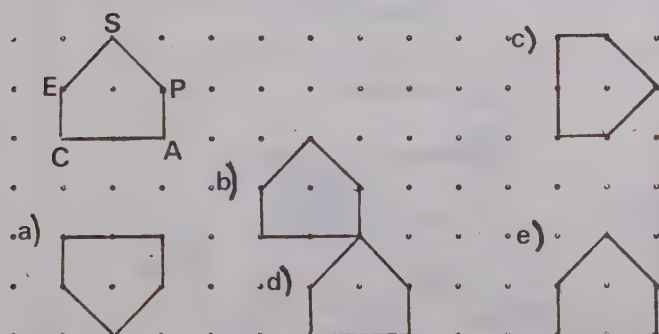
1. Answer the following questions, using the diagrams below.

(i- indicates the image)

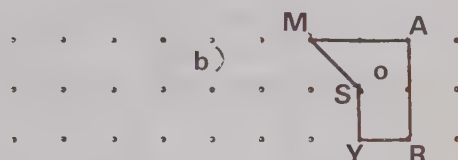
- (i) Which images were produced by a slide?
- (ii) Give the slide notations for the two slides in (i).



2. Which of the following are slide images of polygon 'SPACE'?



3. For each of the following, determine if the given segment or segments, are the slide image of one of the sides of the polygon. Draw the diagram on your dot paper and complete the image. Give the slide notation for each slide.



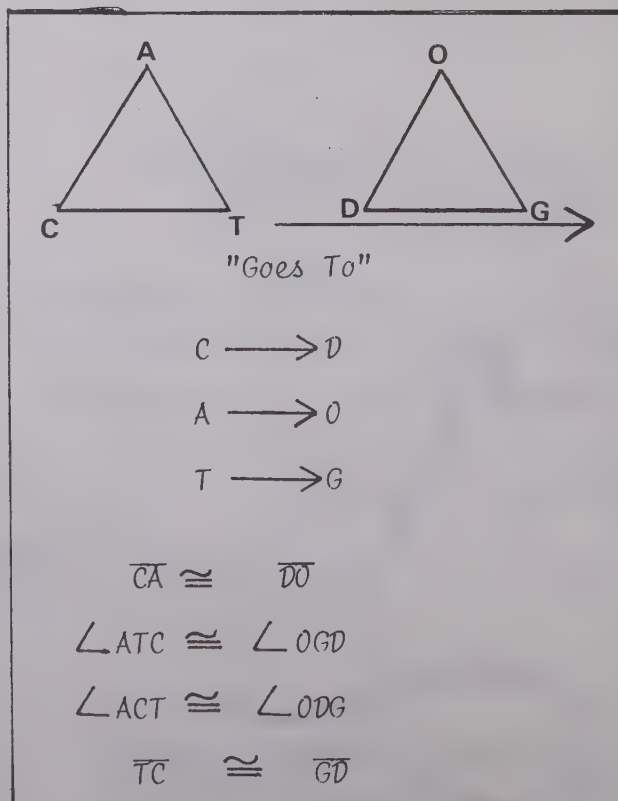
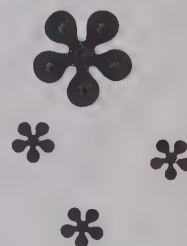
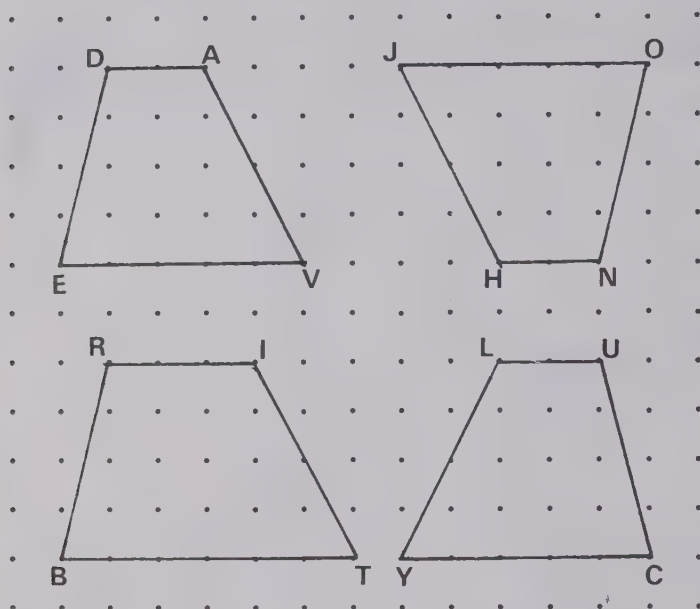
4. The following statements are either *true* or *false*.

- a. If a figure has a vertex A in the top right corner, then the slide image will have A^1 in the top right corner.
- b. A slide image is at an angle to the original of 90° .
- c. If APES are the vertices of a square going clockwise about the figure, then A'S'E'P' are the vertices of the slide image going clockwise.
- d. A slide image can be formed by sliding the original right or left, up or down, or sideways, but no turning or flipping is allowed.

Slides do not turn or flip.

5. From the following diagrams:


- Choose the figures congruent to DAVE.
- Construct a "Goes To" table for DAVE and each of the congruent figures.
- List all the corresponding congruent parts from each "Goes To" table.



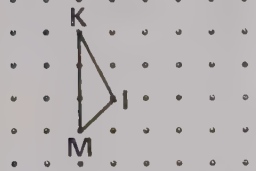
EXERCISES:

OBJECTIVE NO. 5

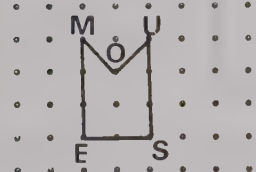
1. Copy the following on to your dot paper and obtain the indicated slide images. Always use image one to obtain image two.

(a)  Slide One (1R, 0)

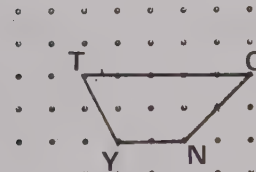
Slide Two (1R, 1U)

(b)  Slide One (1R, 1D)

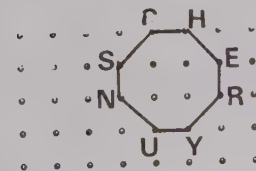
Slide Two (2L, 0)

(c)  Slide One (2R, 2D)

Slide Two (2L, 2U)

(d)  Slide One (0, 2D)

Slide Two (2R, 0)

(e)  Slide One (3L, 4D)

Slide Two (1R, 2U)

2. Each of the combinations in #1 can be described as a single slide. Use slide notation to name each of the single slides. The first is done as an example.

(a) $(1R, 0) + (1R, 1U) \sim (2R, 1U)$

3. Write a single slide that would produce the same results as:

(a) $(2R, 4U)$ followed by $(1R, 1U)$

(b) $(3R, 1U)$ followed by $(1L, 2D)$

(c) $(2L, 1D)$ followed by $(4L, 4U)$

(d) $(1L, 2D)$ followed by $(2R, 5U)$

(e) $(3L, 3D)$ followed by $(3R, 3U)$

(f) $(2R, 3D)$ followed by $((4L, 1U)$

4. Determine the missing slide.

(a) $(2L, 2D) + (4R, 3U) \sim (2R, 1U)$

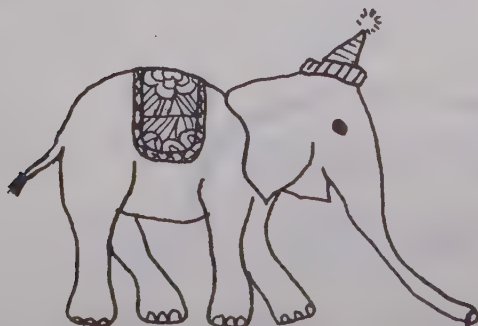
(b) $(5R, 2U) + () \sim (0, 2D)$

(c) $(1R, 3U) + () \sim (4R, 5U)$

(d) $(6R, 4D) + () \sim (2L, 3U)$

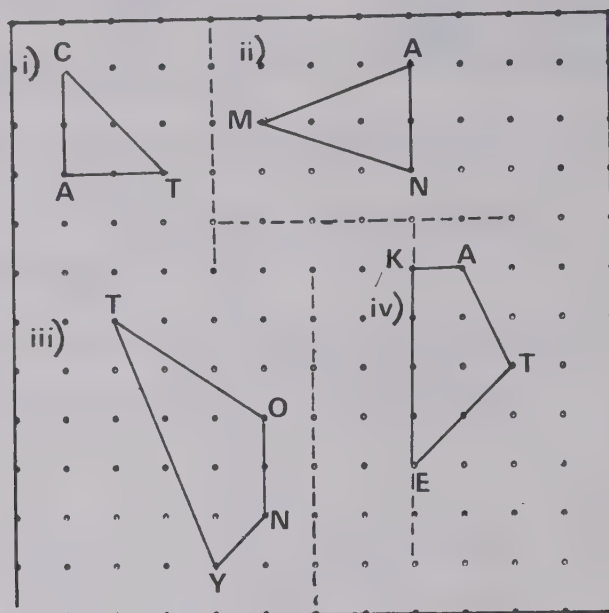
(e) $(3L, 4D) + () \sim (2R, 0)$

(f) $(0, 3U) + () \sim (2R, 1U)$



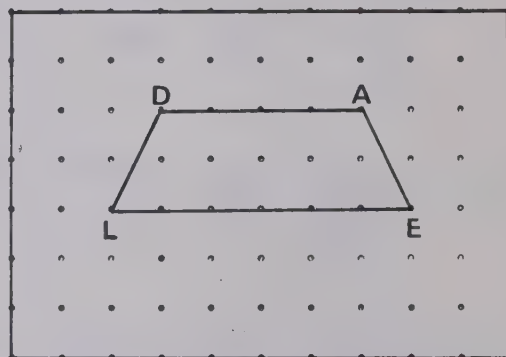
**SLIDES
CAN BE
ADDED**

1. Draw each of the following polygons and mirror lines on your dot paper and draw the images.



2. Find four mirror images of polygons DALE. Use each of the sides as a mirror line.

NOTE: Only reflect the original.



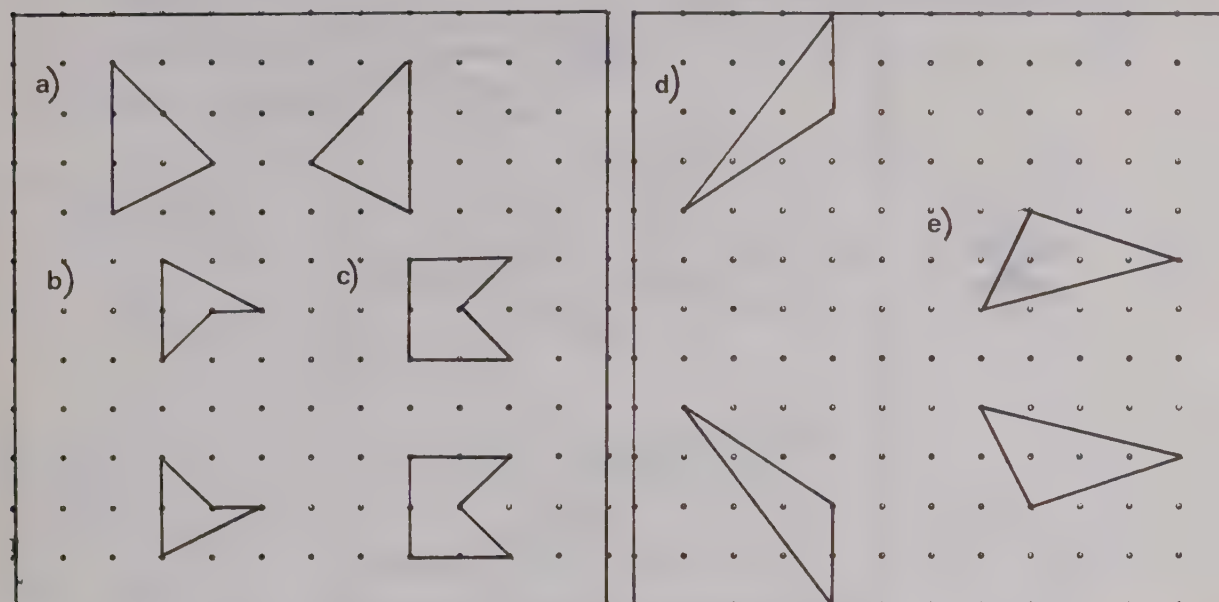
3. What letters of the alphabet and numerals look the same under a reflection in a horizontal line?



WHEN A POLYGON IS REFLECTED:

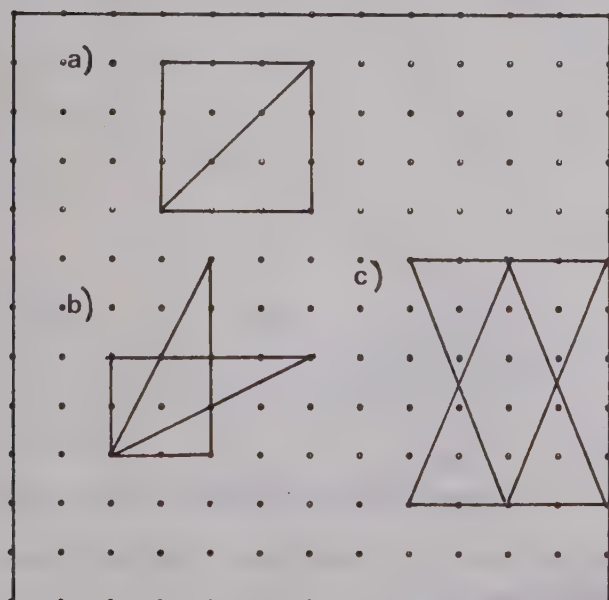
- (i) the original and its image are \cong .
- (ii) the corresponding vertices of a polygon and its image are equi-distant from the mirror line.

4. In each of the following, copy the polygon and its image on your dot paper. Find and draw the mirror line by manipulating your mirror.



5. Repeat #4 by folding your paper so that the image falls on the original. What is the mirror line for each?

6. Find the mirror lines in these pictures. (Use either method).

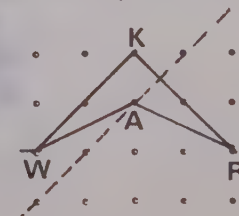
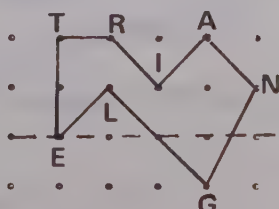
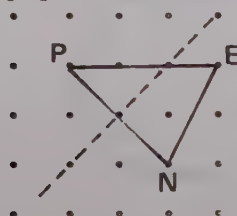


A MIRROR LINE MAY BE
FOUND BY:

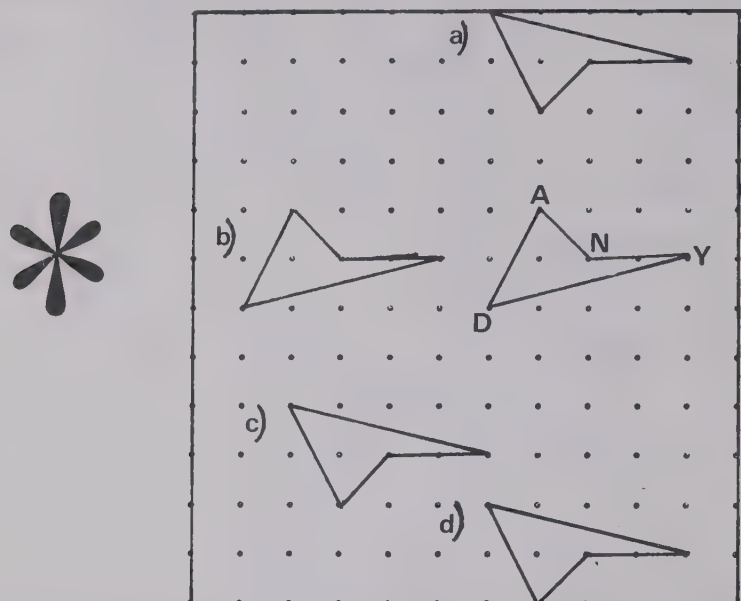
- (a) paper folding, and
(b) manipulating the mirror
(c) counting



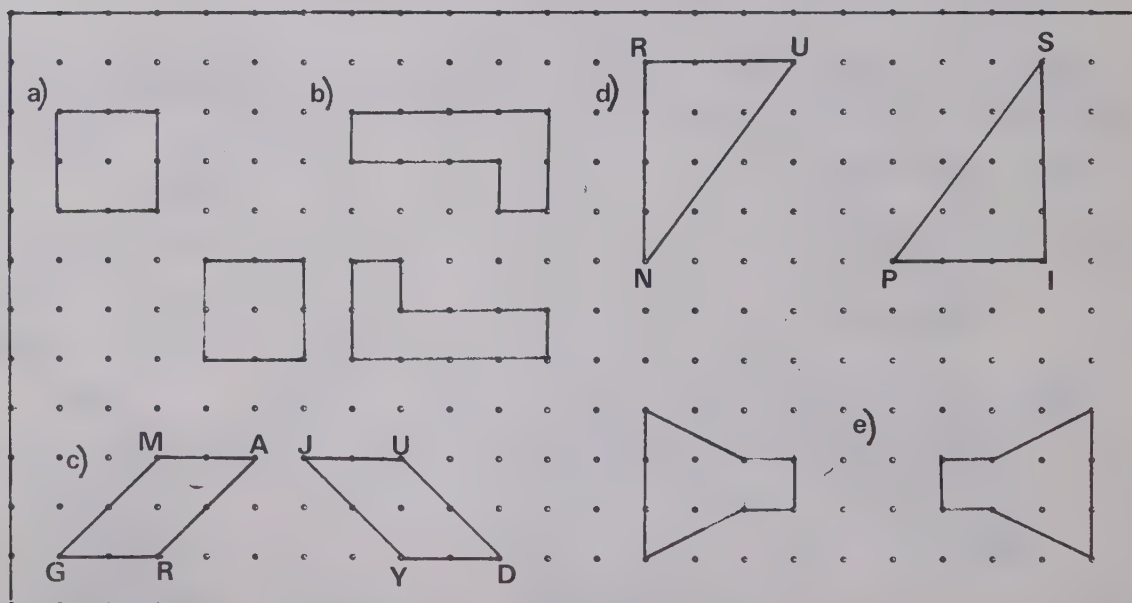
- *7. Place each of the following polygons and mirror lines on your dot paper and draw the images. (Hint: look in both sides of the mirror).



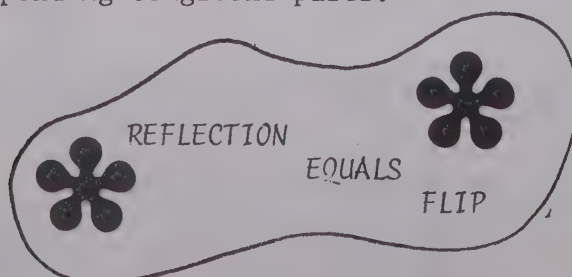
1. In the following, all polygons are congruent to polygon DANY. Which of them are reflection images of it?



2. (a) Indicate which of the following congruent figures were produced by a reflection or flip.



- (b) Set up a "Goes To" table for (c) and (d) above and list all the corresponding congruent parts.



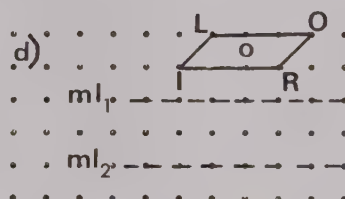
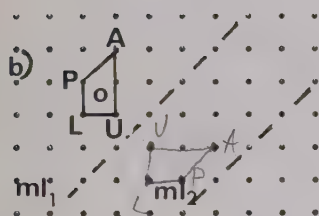
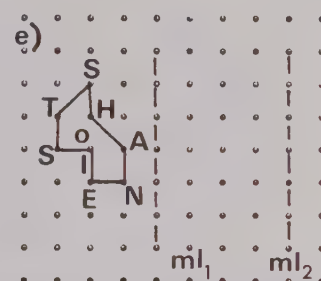
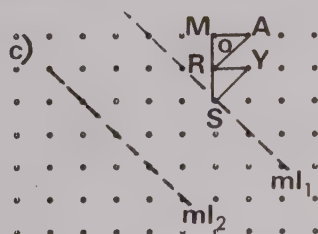
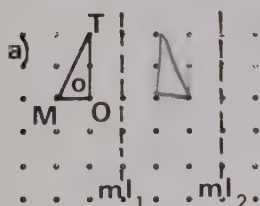
Successive Reflections

53.

EXERCISES:

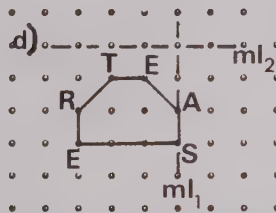
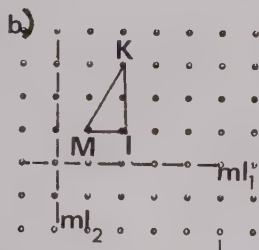
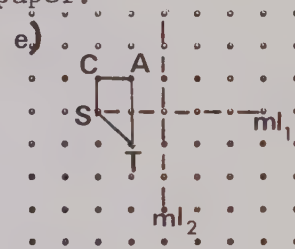
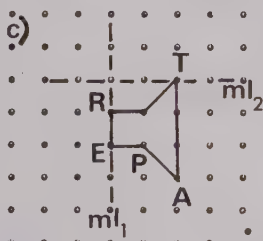
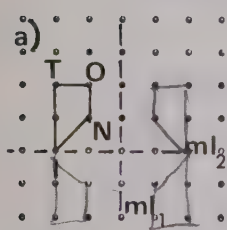
OBJECTIVE NO. 9

- Copy the following on to your dot paper. Reflect original in ml_1 (mirror line). Draw image. Reflect image in ml_2 . Draw second image. Label all images.



f) What one motion would produce the same result as reflecting into two parallel lines?

- In this exercise, your mirror lines are not parallel but perpendicular. Find the image after both reflections. Use your dot paper.



- Copy exercise #2(a) and #2(b) on to your dot paper again. This time reflect ml_2 then ml_1 .
 - Does your final image for exercise #2 look different from your final image in exercise #3?

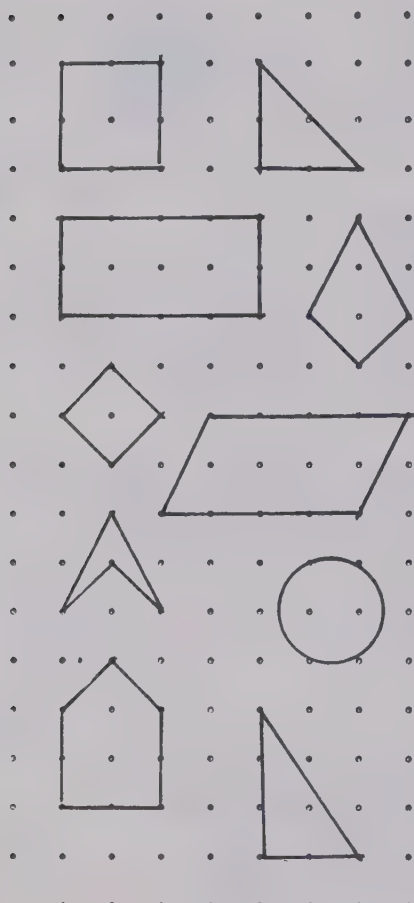
REMEMBER:

Always draw image one first,
then reflect ONLY image one.

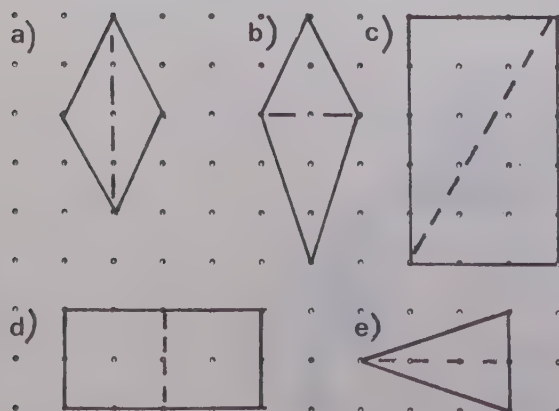


Lines of Symmetry

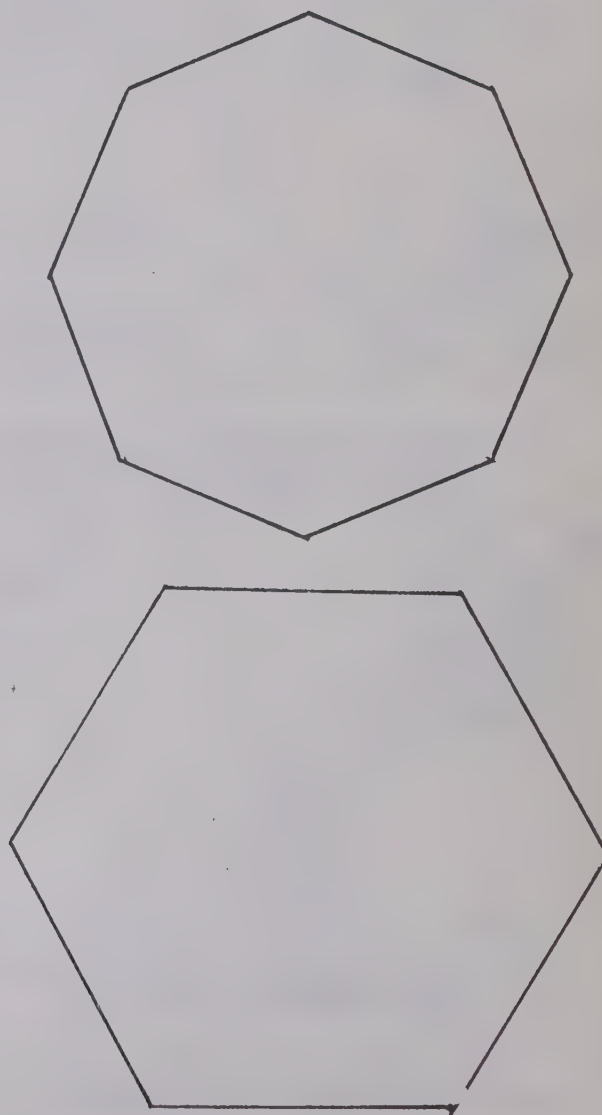
1. Copy the following onto your dot paper and draw all the lines of symmetry for each.



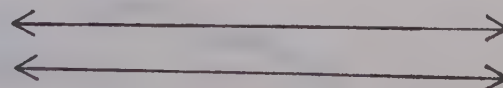
2. List the polygons in which the dotted lines are lines of symmetry. Use your mirror to check.



3. Trace the following figures very carefully. Cut out your tracings and locate all lines of symmetry by folding.

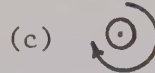
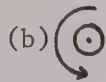
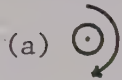


4. (a) Draw four lines of symmetry for these parallel lines.

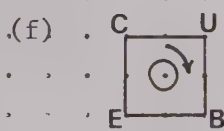
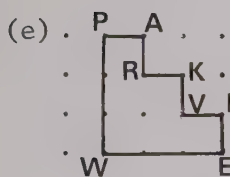
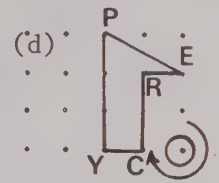
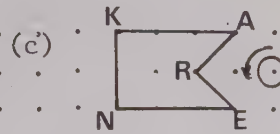
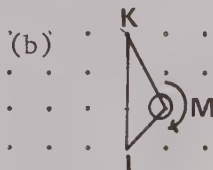
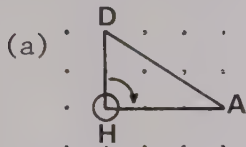


- (b) How many possible lines of symmetry are there?

1. Write the notation to describe the following turns.



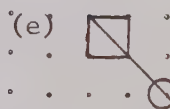
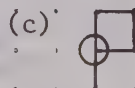
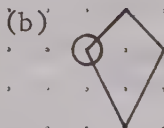
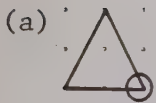
2. Copy each figure on to your dot paper and draw the turn image for each one.



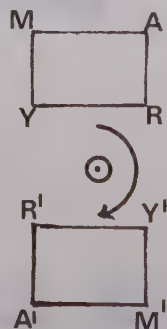
A 180° Turn is called a
Half-Turn

(g) What happens to polygon CUBE under any turn of $(\frac{1}{4}, \frac{1}{2}, \frac{3}{4})$ using the given turn center?

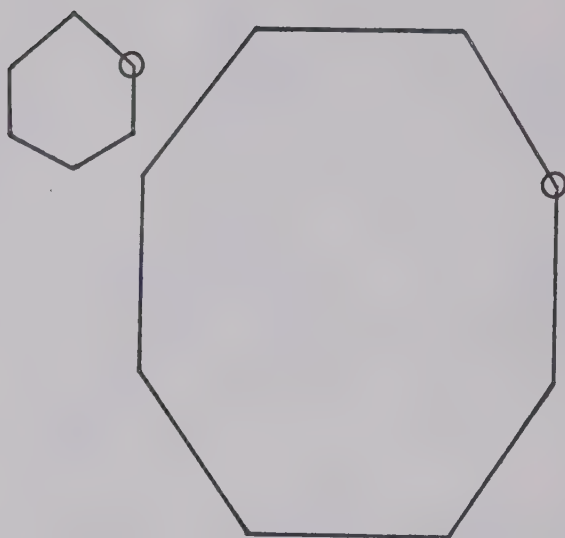
3. Copy the following on to your dot paper. Draw turn image for $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$, cw for all the diagrams.



LABEL ALL DIAGRAMS -



4. Trace each figure on to your paper and draw the $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ cw images for each polygon.

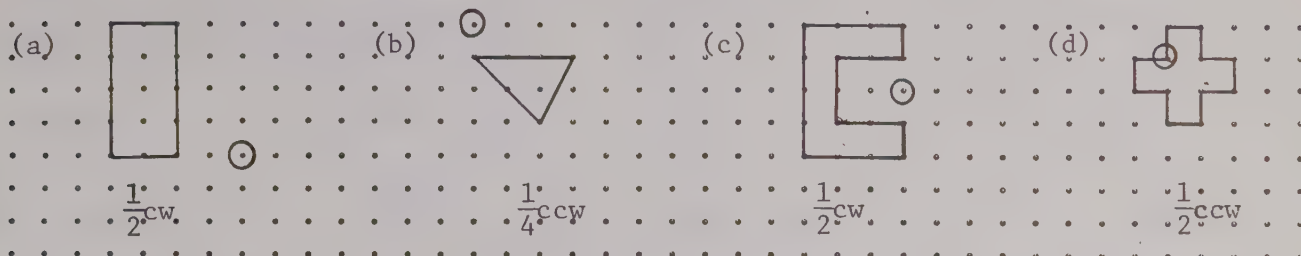


EXERCISES:

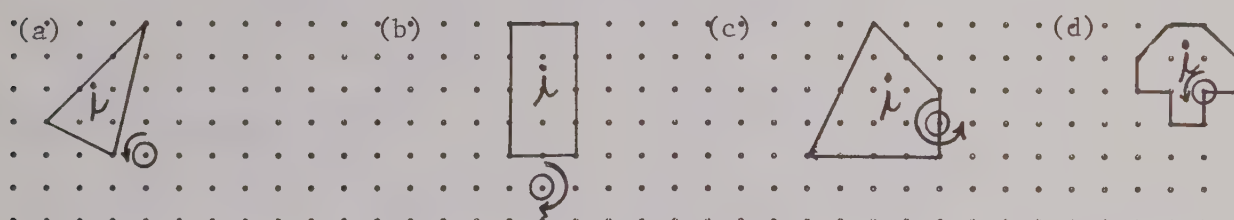
OBJECTIVE NO. 12

A. Copy on to your dot paper and draw:

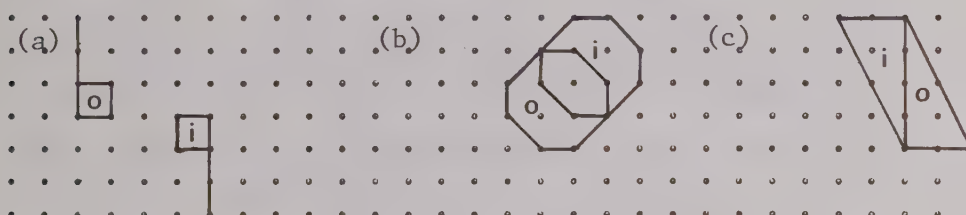
1. the turn images



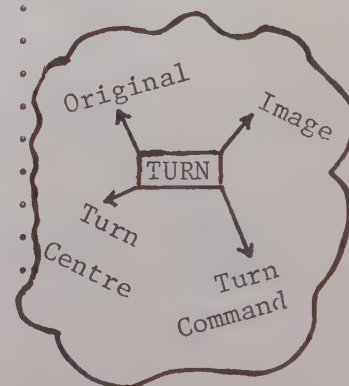
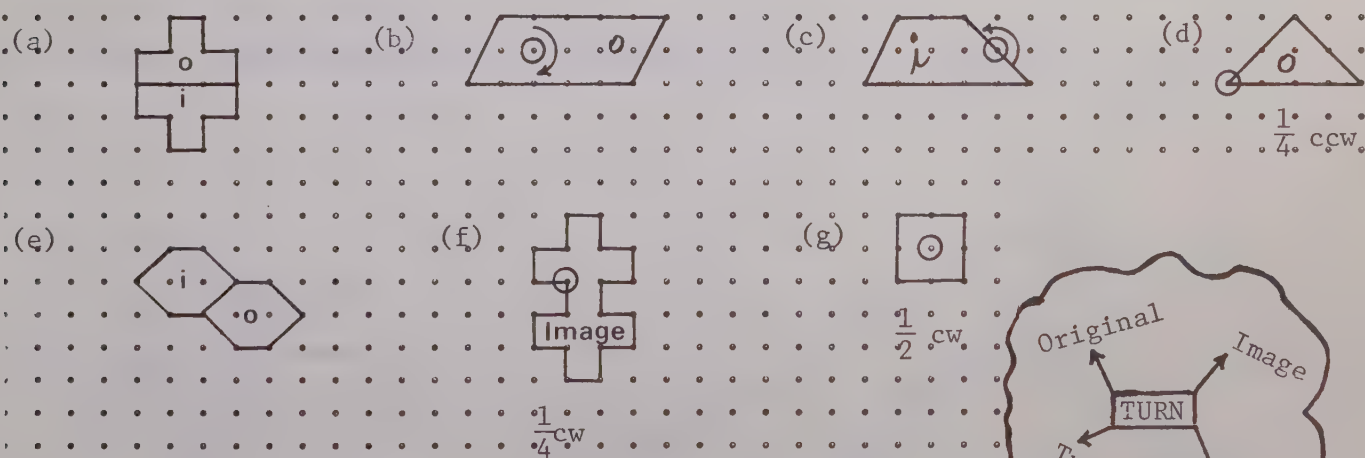
2. the original



3. the turn center. Write the turn notation.

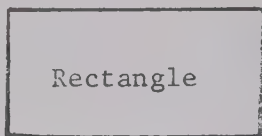


B. Copy onto your dot paper and put in the missing components.



1. Trace the following figures and determine the order of turn symmetry of each.

(a)



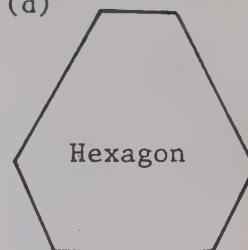
(b)



(c)



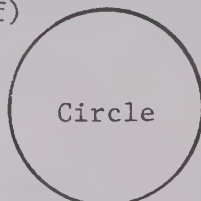
(d)



(e)

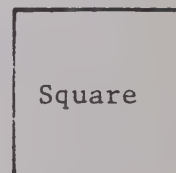
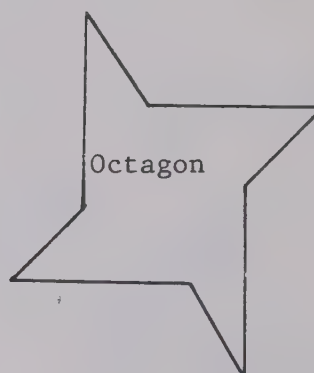
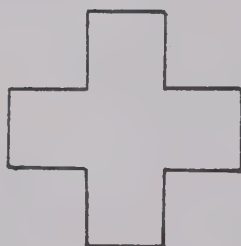
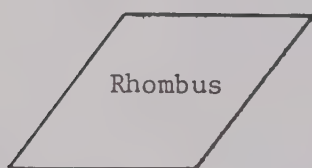


(f)



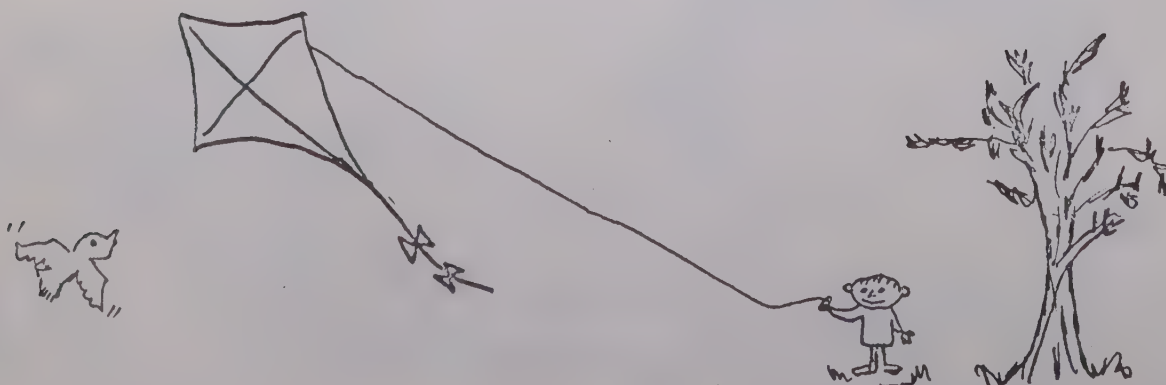
A TURN that maps a figure
onto itself is called a
TURN SYMMETRY.

2. Find the turn center and the order of turn symmetry for each figure below.

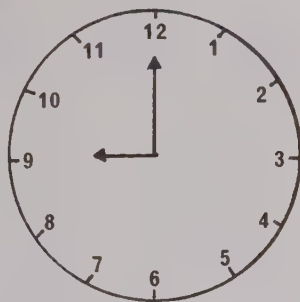


3. Which of the capital letters have a $\frac{1}{2}$ turn symmetry?

4. The numeral 1961 has half-turn symmetry. Can you find other numerals with half-turn symmetry?



5. A clock can be used to tell time by observing the position of the hands (minute and hour) as they rotate about the centre of the clock dial. Below are 8 turns for the minute and hour hands on a clock. Give the time interval in minutes or hours for each turn represented. Use the clock dial in the diagram to help you.



TURN

Minute Hand

$$\frac{1}{2} \text{ c.w.} = 30 \text{ minutes}$$

$$\frac{1}{4} \text{ c.w.} =$$

$$\frac{3}{4} \text{ c.w.} =$$

$$1 \text{ c.w.} =$$

Hour Hand

$$\frac{3}{4} \text{ c.w.} = 9 \text{ hours}$$

$$\frac{1}{4} \text{ c.w.} =$$

$$1 \text{ c.w.} =$$

$$\frac{1}{2} \text{ c.w.} =$$

6. Given the final time and the turn arrow for each hand, find the original time. (Hint: Draw in the time on clock and use c.c.w. arrow.)

- (a) Final time - 11:30 A.M. Original time is 11:15 A.M.

$$\frac{1}{4} \text{ c.w. (minute hand)}$$

- (b) Final time - 9:15 A.M.

$$\frac{3}{4} \text{ c.w. (hour hand)}$$

- (c) Final time - 5:45 P.M.

$$\frac{1}{2} \text{ c.w. (minute hand)}$$

- (d) Final time - 7:00 P.M.

$$\frac{1}{4} \text{ c.w. (hour hand)}$$

- (e) Final time - 1:15 P.M.

$$\frac{1}{2} \text{ c.w. (hour hand)}$$

- (f) Final time - 2:30 A.M.

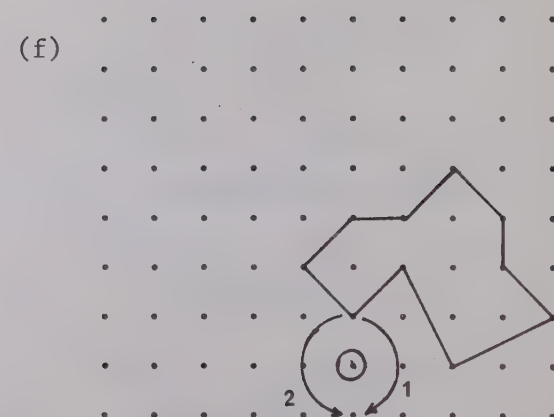
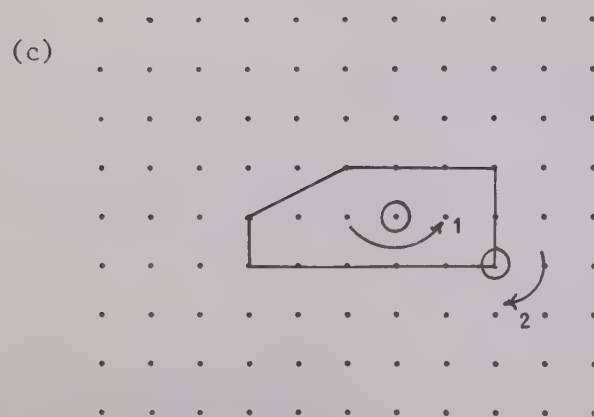
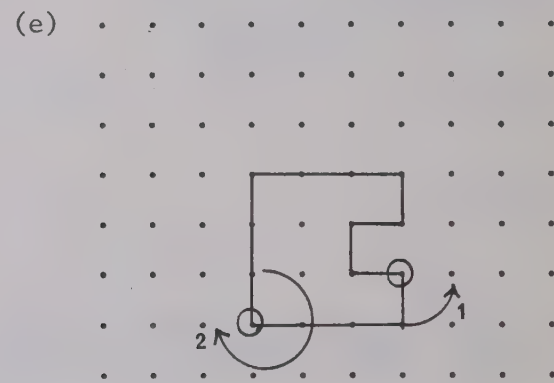
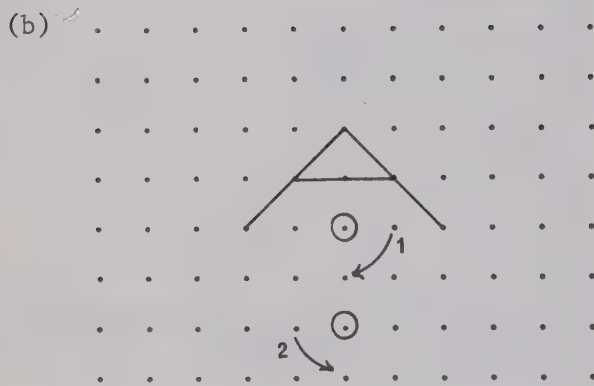
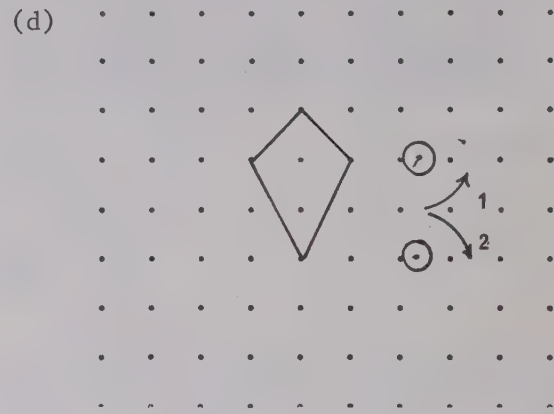
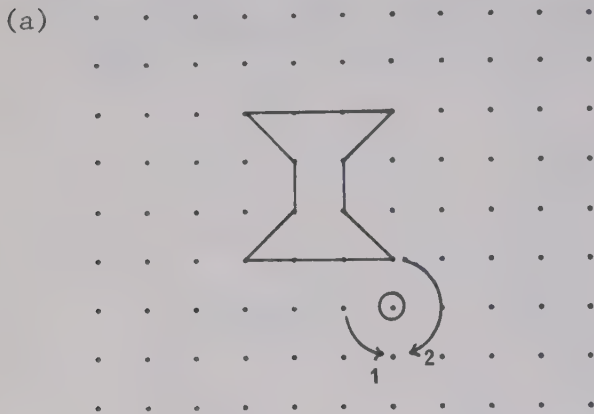
$$\frac{3}{4} \text{ c.w. (minute hand)}$$



EXERCISES:

OBJECTIVE NO. 14

Copy the following diagrams on your dot paper and find the turn images as required.

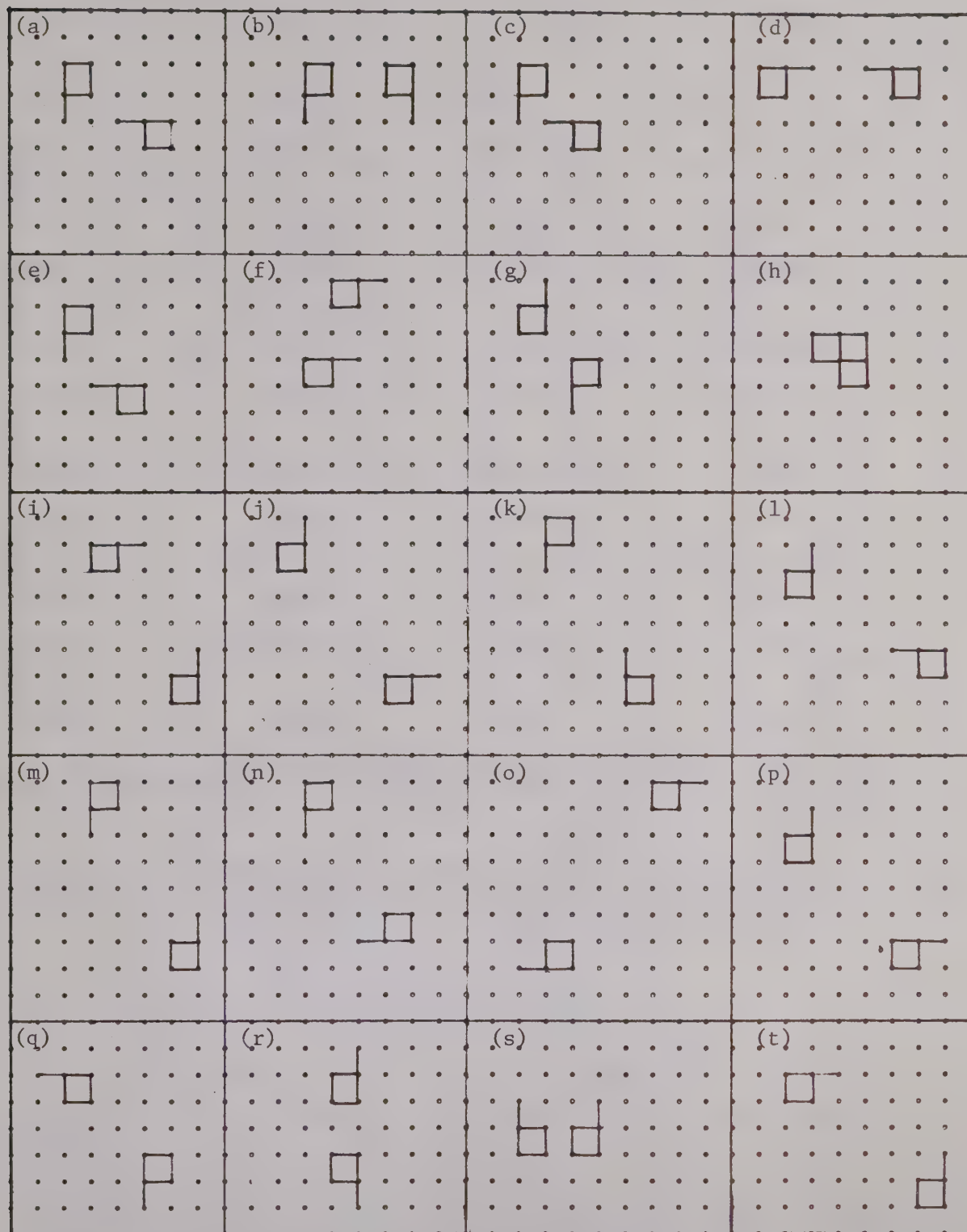


Use the first image
to find the second image.

EXERCISES:

OBJECTIVE NO. 15

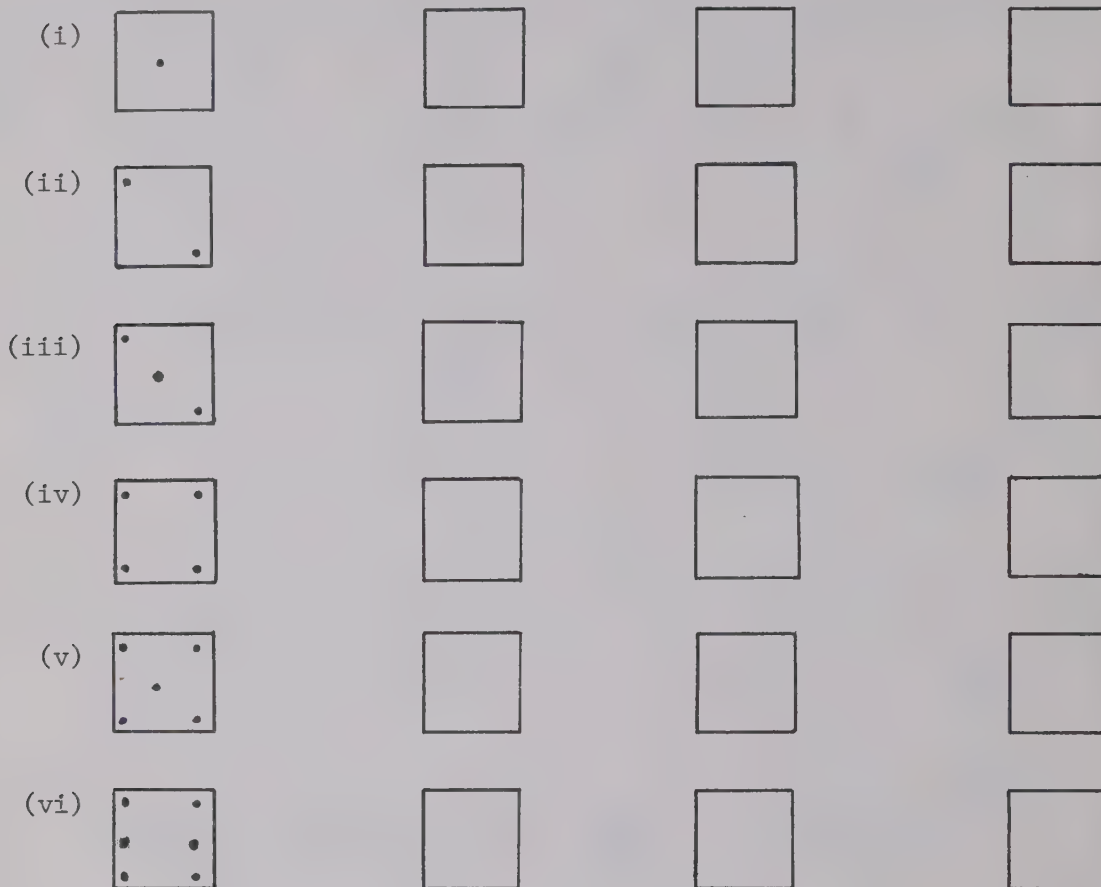
1. In the diagram below name the motion used to produce each of the images.



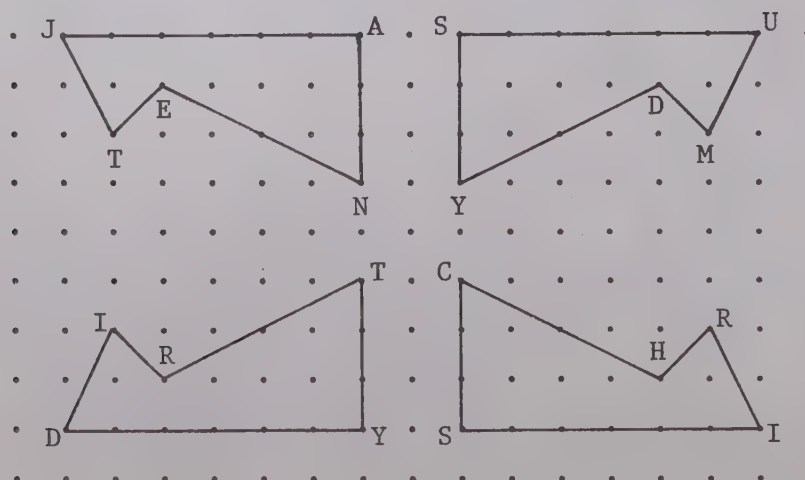
EXERCISES: (Cont'd.)

OBJECTIVE NO. 15

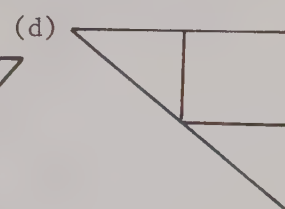
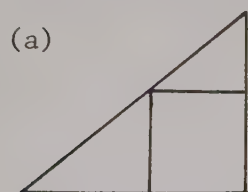
2. (a) The six faces of a die are pictured below. Draw $\frac{1}{4}$ c.w., $\frac{1}{2}$ c.w., $\frac{3}{4}$ c.w. images for each face. Below each diagram state whether the image could also be produced by a slide or flip or both from the original.



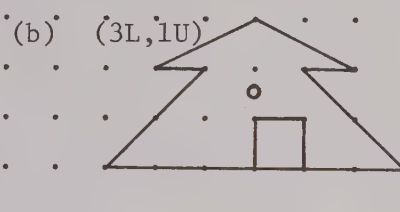
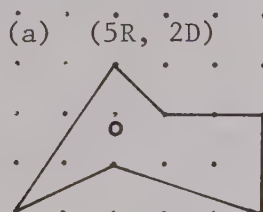
- (b) List those faces which have turn symmetry of order 1, 2, 3, 4.
 (c) List those faces *whose* images all could have been produced by all three motions.
3. (a) Choose the pair of congruent figures that are produced by a turn.
 (b) Set up a "Goes To" table for the pair of figures from (a) and name the corresponding congruent parts.



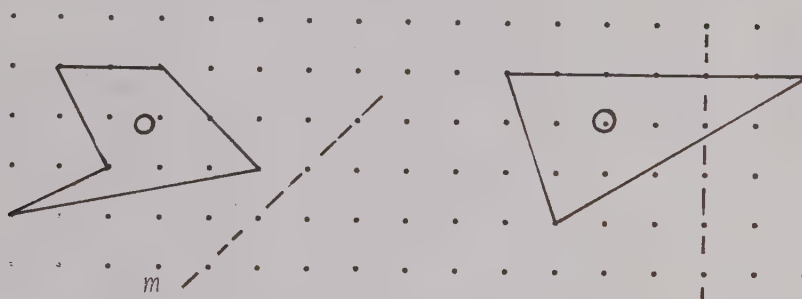
1. Choose the pair of figures that are congruent.



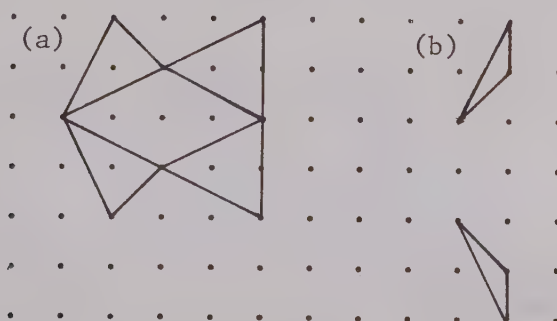
2. Find the slide image for each original below. The slide notation is given. Draw a slide arrow.



3. Find the mirror images for each original below.



4. Locate all mirror lines for each diagram below.



5. Trace the square, then draw the flip image. Answer the following questions.

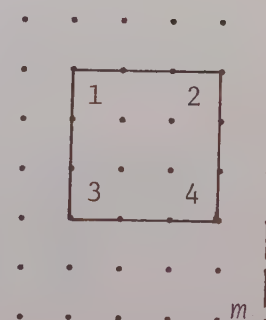
(a) State the number in the top left corner of the original.

State the number in the top left corner of the image.

(b) State the number in the bottom right of the original.

State the number in the bottom right of the image

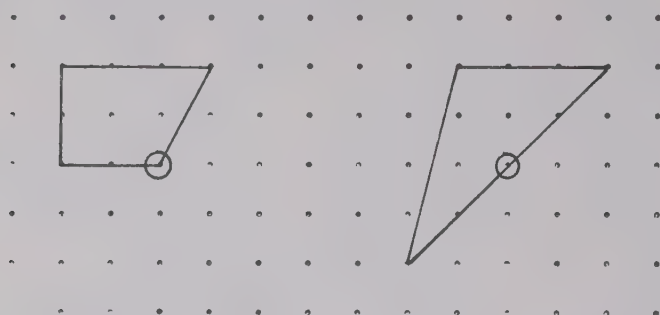
(c) Place a mirror on m ; do your answers for (a) and (b).
Check out?



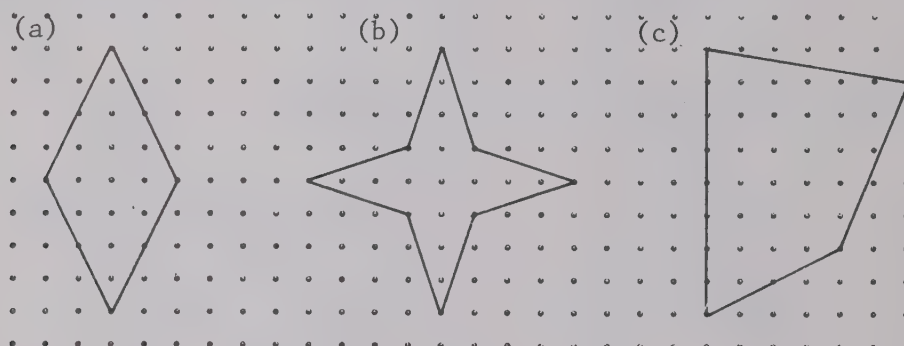
6. Locate the turn images for each original below.

(a) $\frac{1}{4}$ ccw

(b) $\frac{1}{2}$ cw

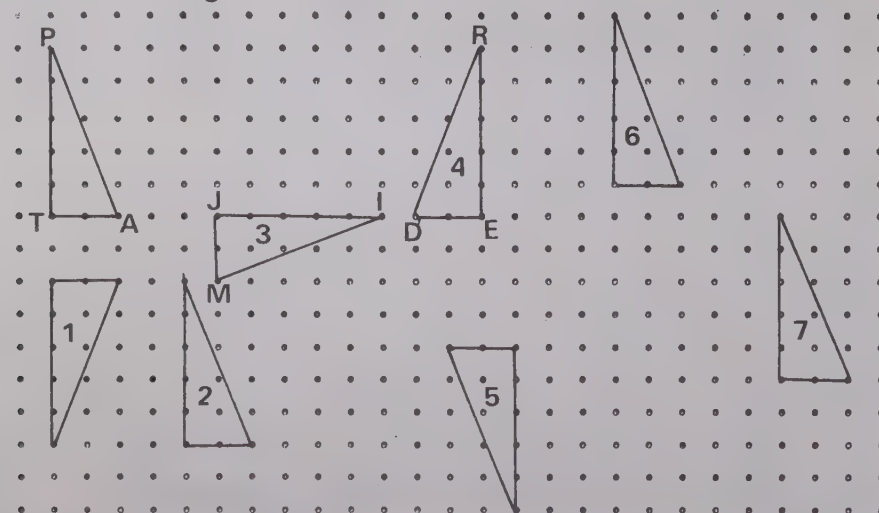


7. Locate *all* lines of symmetry and give the ORDER OF TURN SYMMETRY for each figure below.



8. List *all* figures which could be

- (a) Slide Images of $\triangle PAT$
- (b) Turn Images of $\triangle PAT$
- (c) Reflection Images of $\triangle PAT$

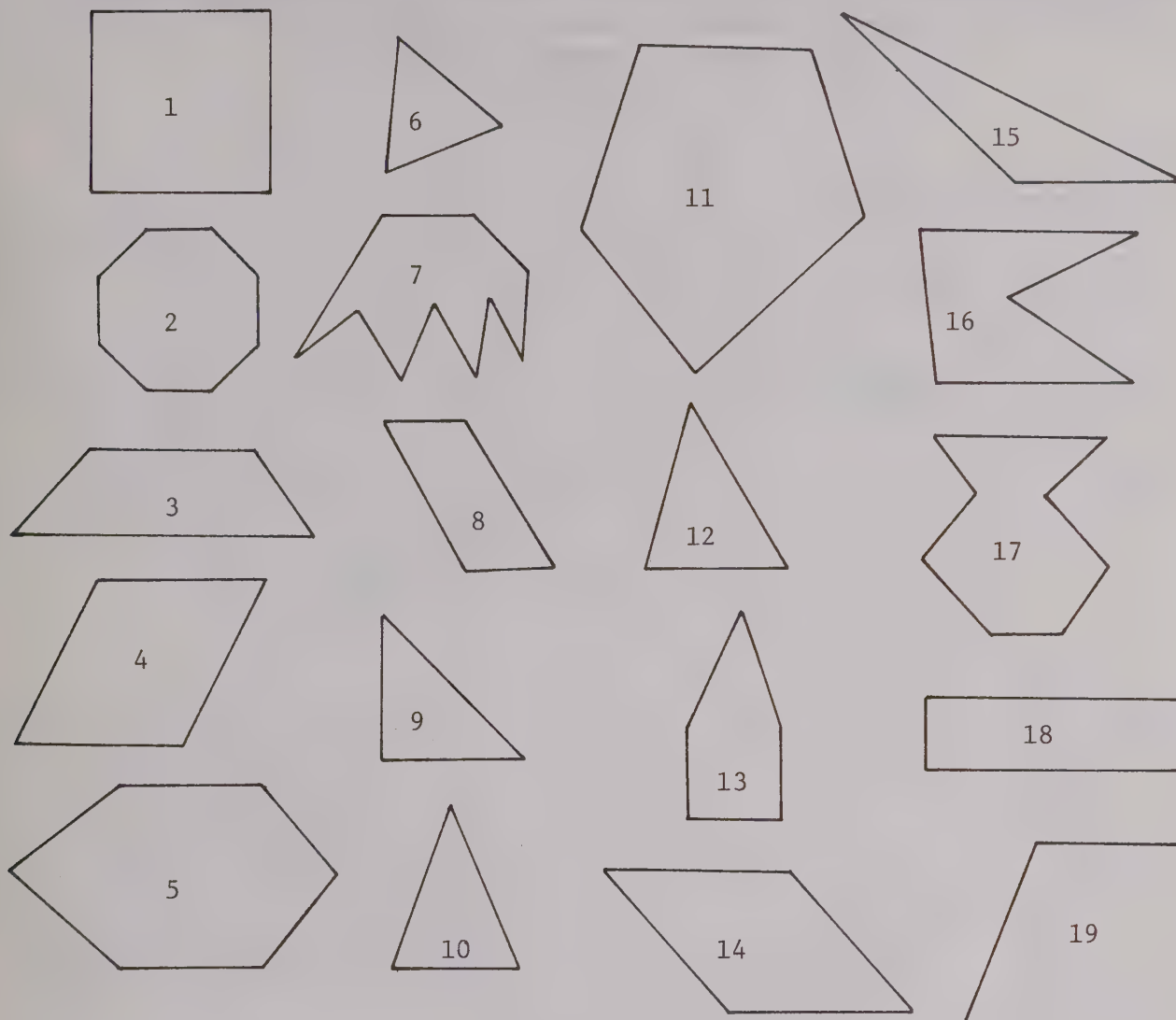


- (d) Set up a "Goes To" table and name the corresponding congruent parts for $\triangle PAT$ and for
 - (i) $\triangle JIM$
 - (ii) $\triangle RED$

EXERCISES:

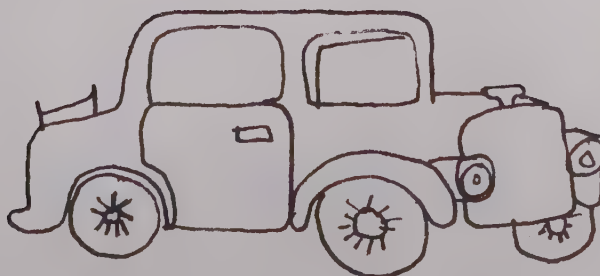
OBJECTIVE NO. 17

1. Classify each of the following polygons according to the number of sides.



2. Many highway traffic signs are polygons. Classify the following signs as to the type of polygon.

- | | |
|-----------------|-----------------|
| (a) Stop | (d) Bus Stop |
| (b) School Zone | (e) Speed Limit |
| (c) Yield | |

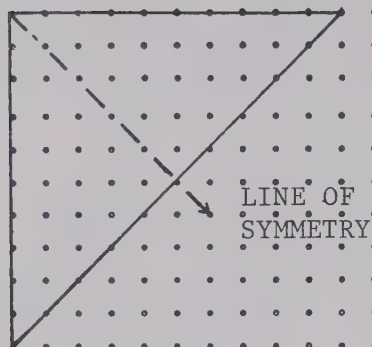


EXERCISES:

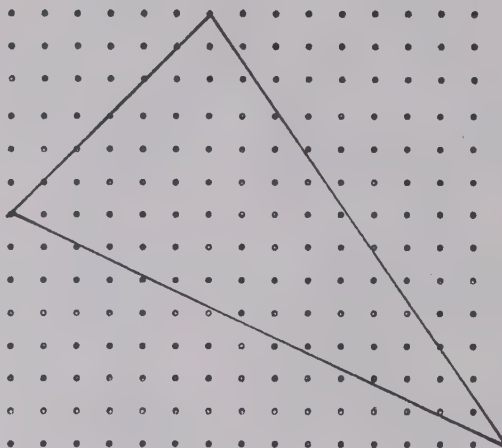
OBJECTIVE NO. 18

1. For each of the following triangles use a mirror, paper folding or tracing to help you find the (a) number of lines of symmetry
(b) number of congruent sides
(c) type of triangle

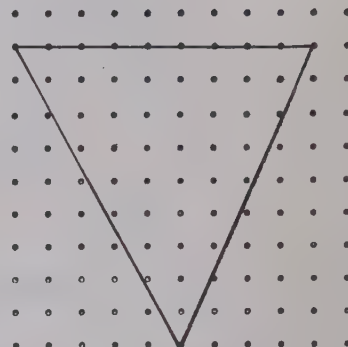
(a)



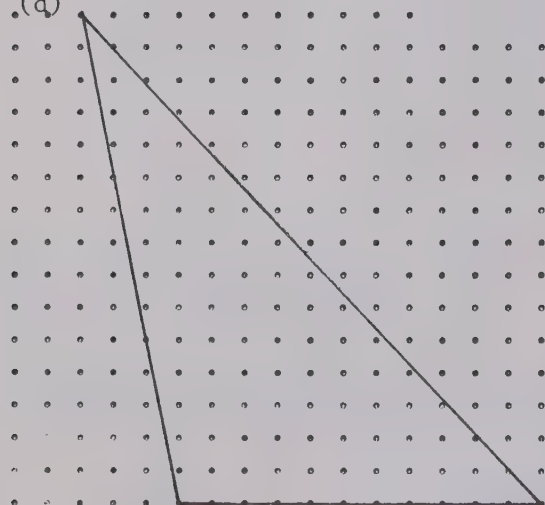
(b)



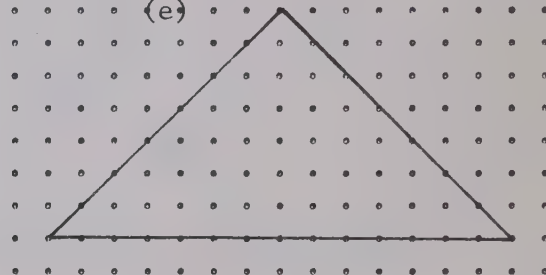
(c)



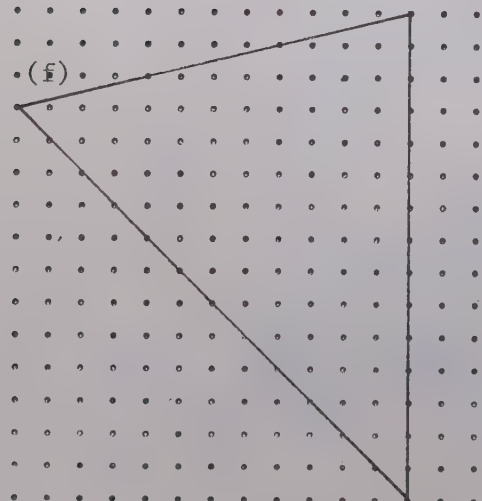
(d)



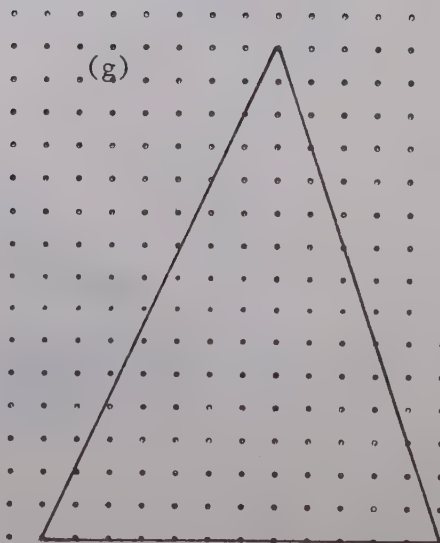
(e)



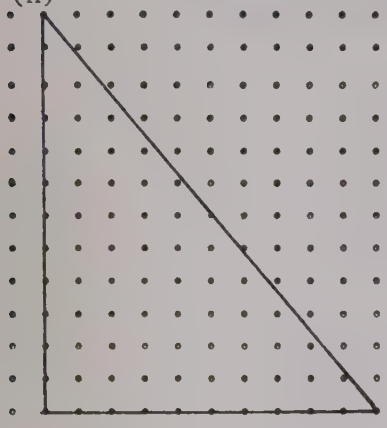
(f)



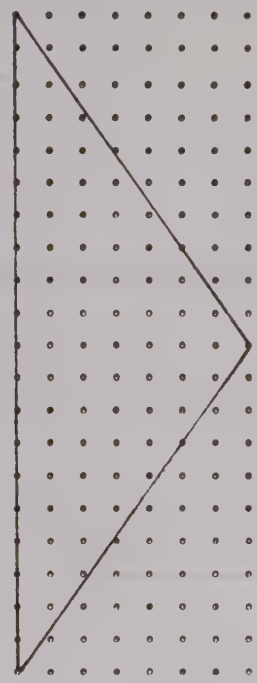
(g)



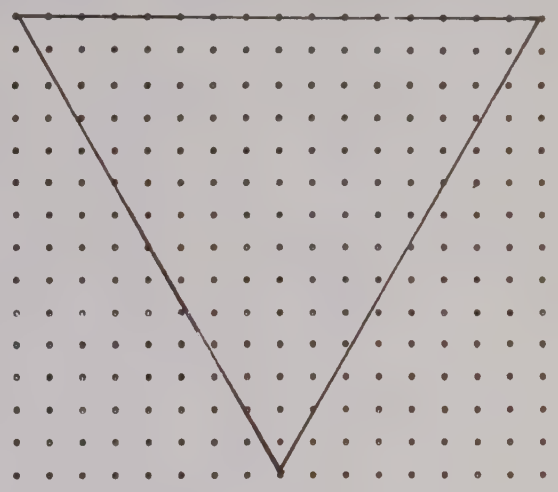
(h)



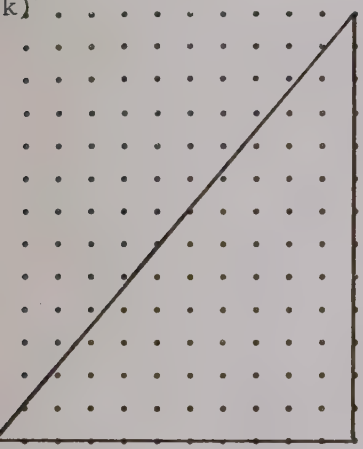
(i)



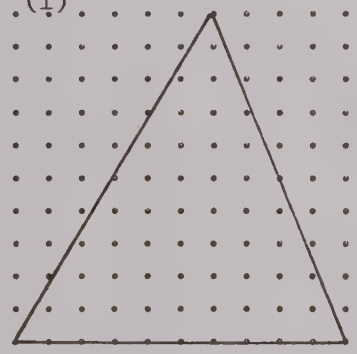
(j)



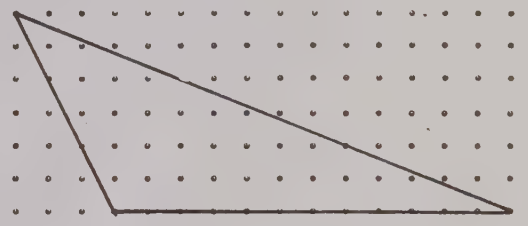
(k)



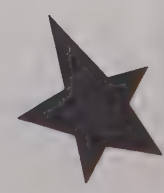
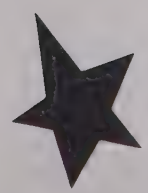
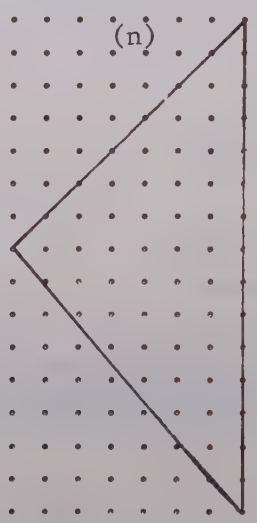
(l)



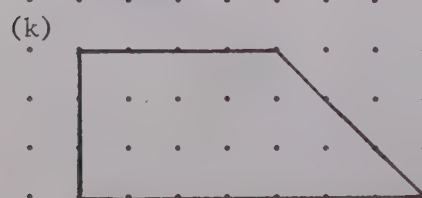
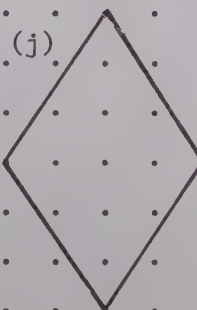
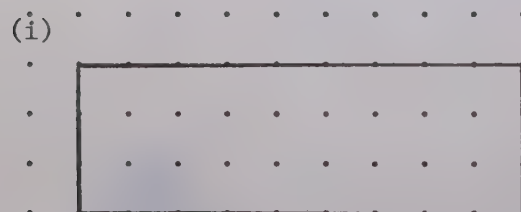
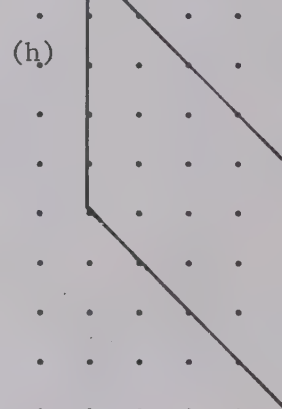
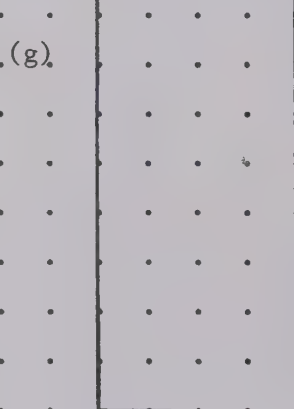
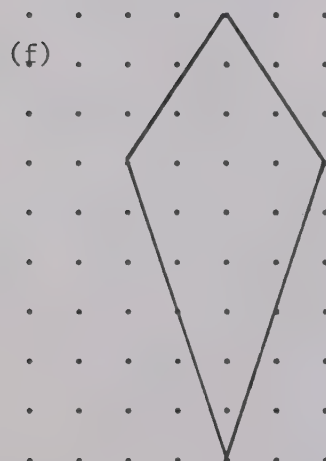
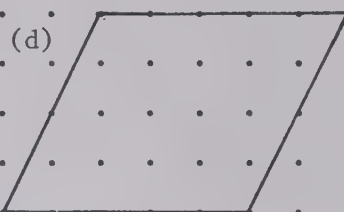
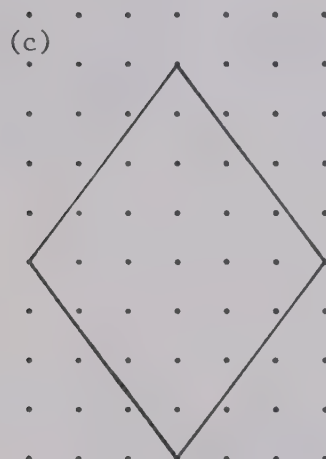
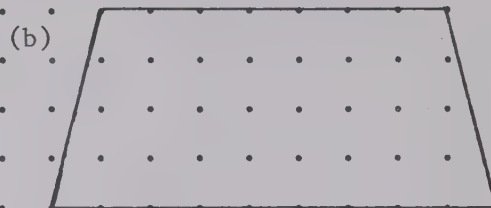
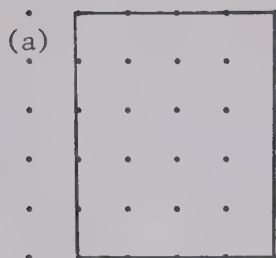
(m)



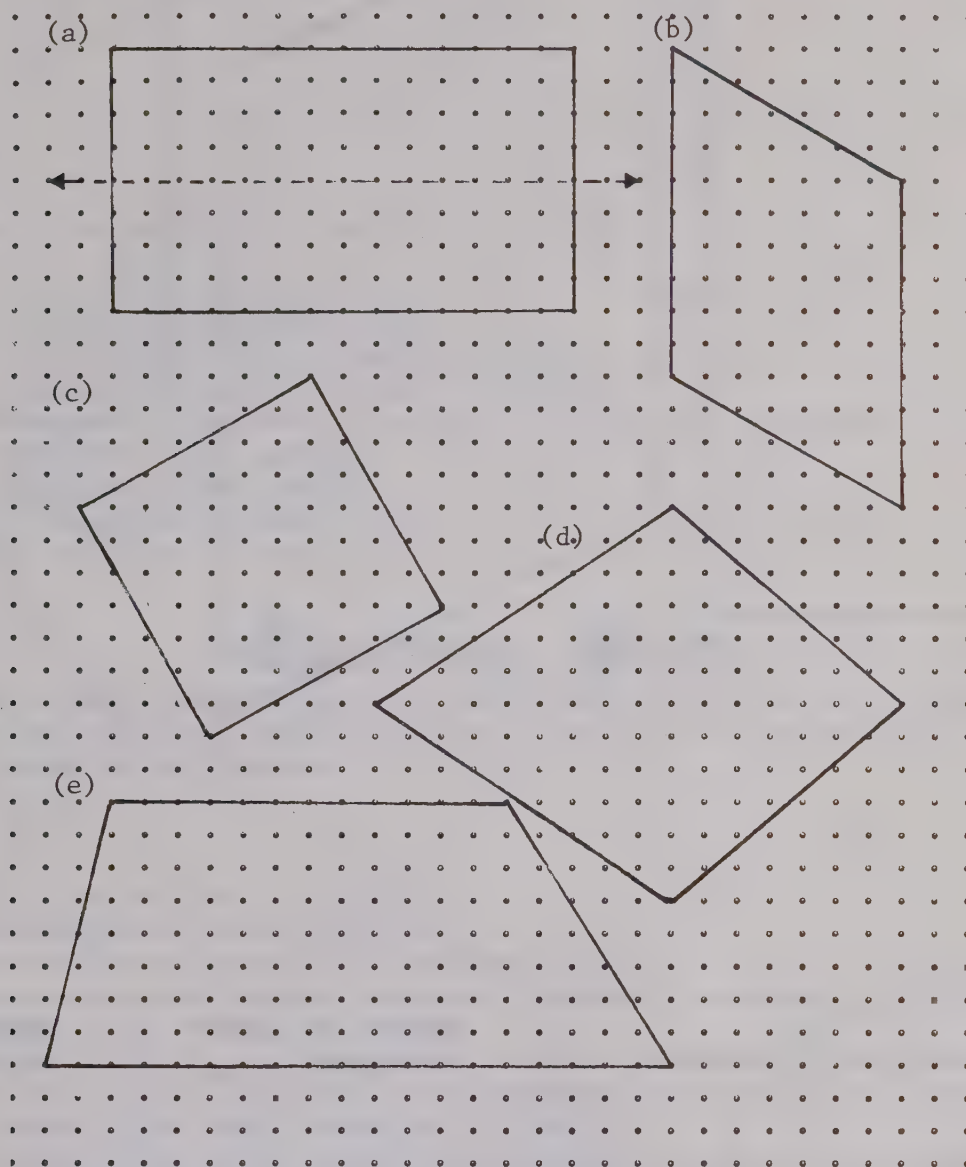
(n)



1. Give the BEST name for each of the following figures:



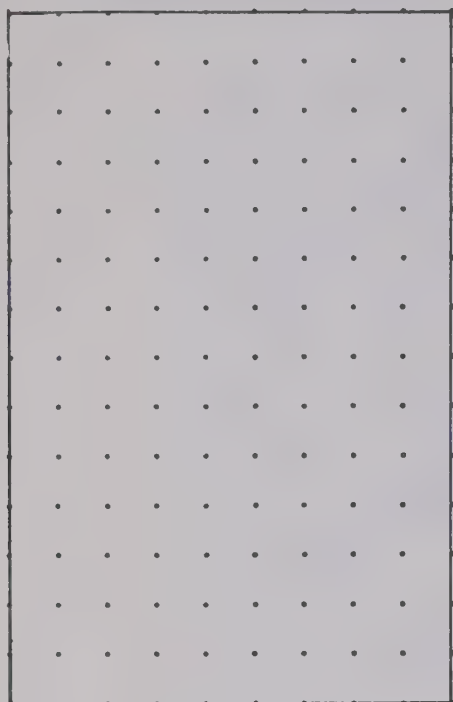
2. Find all the lines of symmetry of each quadrilateral. Construct the following table and fill in the blanks.



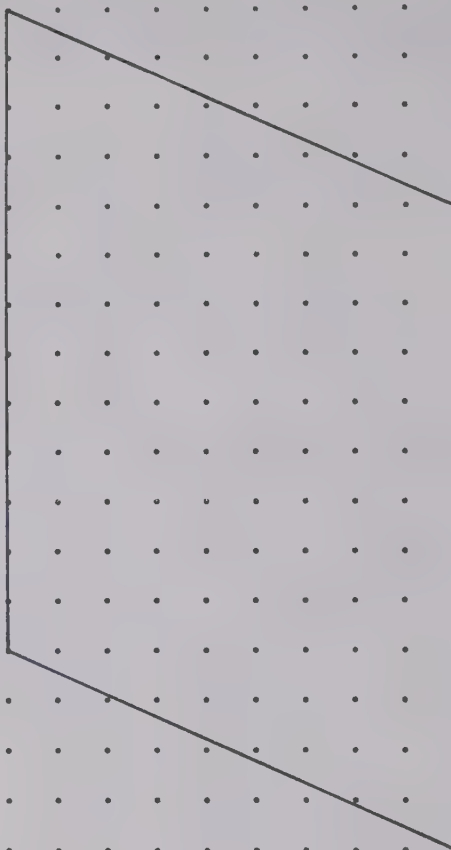
EXERCISES: (Cont'd.)

OBJECTIVE NO. 19

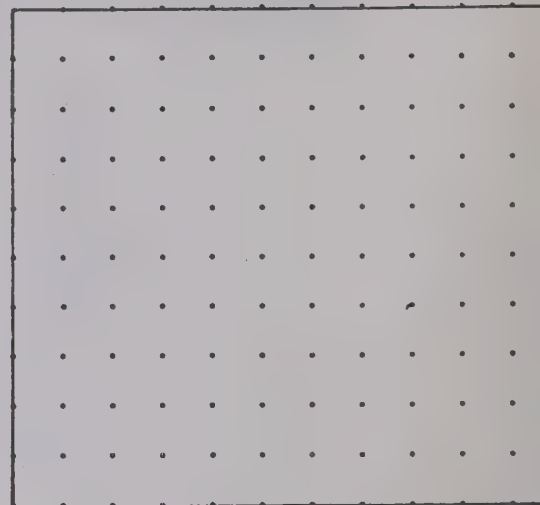
(f)



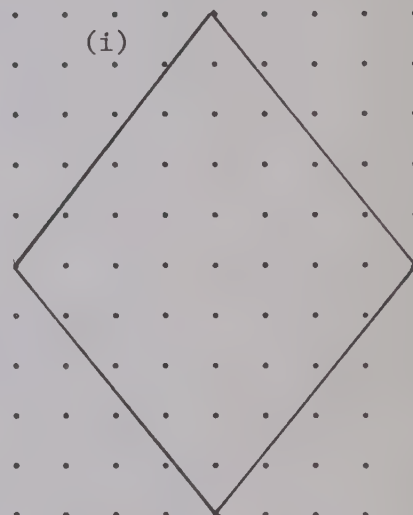
(g)



(h)



(i)

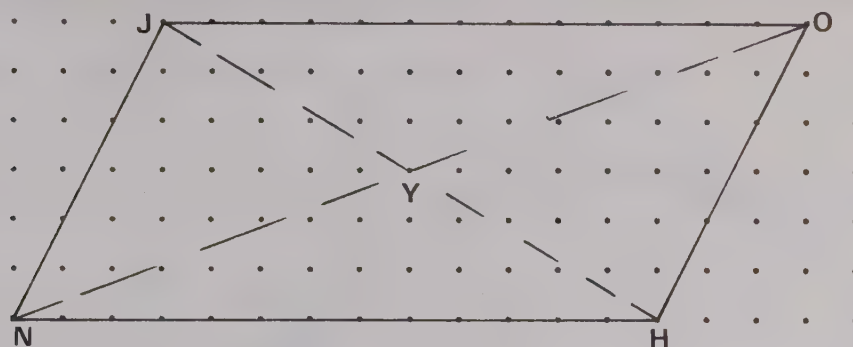


NAME OF QUADRILATERAL		NUMBER OF LINES OF SYMMETRY	NUMBER OF CONGRUENT SIDES
A			
B			
C			
D			
E			
F			
G			
H			
I			

EXERCISES:

OBJECTIVE NO. 20

1. Answer each of the questions below by referring to the diagram.



- Is polygon JOHN a parallelogram? Why? List reasons.
- Name 2 pairs of congruent sides?
- Name 2 other pairs of congruent segments.
- Name 2 pairs of congruent angles from JOHN.
- Name 2 pairs of congruent triangles formed by the diagonals of JOHN.
- JO is opposite what segment?
- $\angle JOH$ is opposite what angle?
- $\angle YNH$ is congruent to what angle?
- $\angle JYO$ is congruent to what angle?

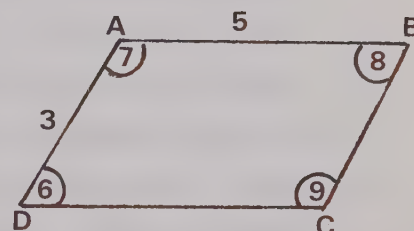
2.

Mystery Math

Each sentence below provides a number clue which can be used in MYSTERY MATH. Find all clues, using the diagram if necessary, to find the answers. All clues are about parallelograms.

CLUES

- A parallelogram has _____ sides.
The missing word is 4. Each "a" in the MYSTERY MATH would be replaced by a 4.
- A parallelogram and one of its diagonals form _____ congruent triangles.
- The number of the angle congruent to angle D.
- The number of the side opposite to side DC.
- The number of the angle opposite angle C.
- The number of the side congruent to side BC.

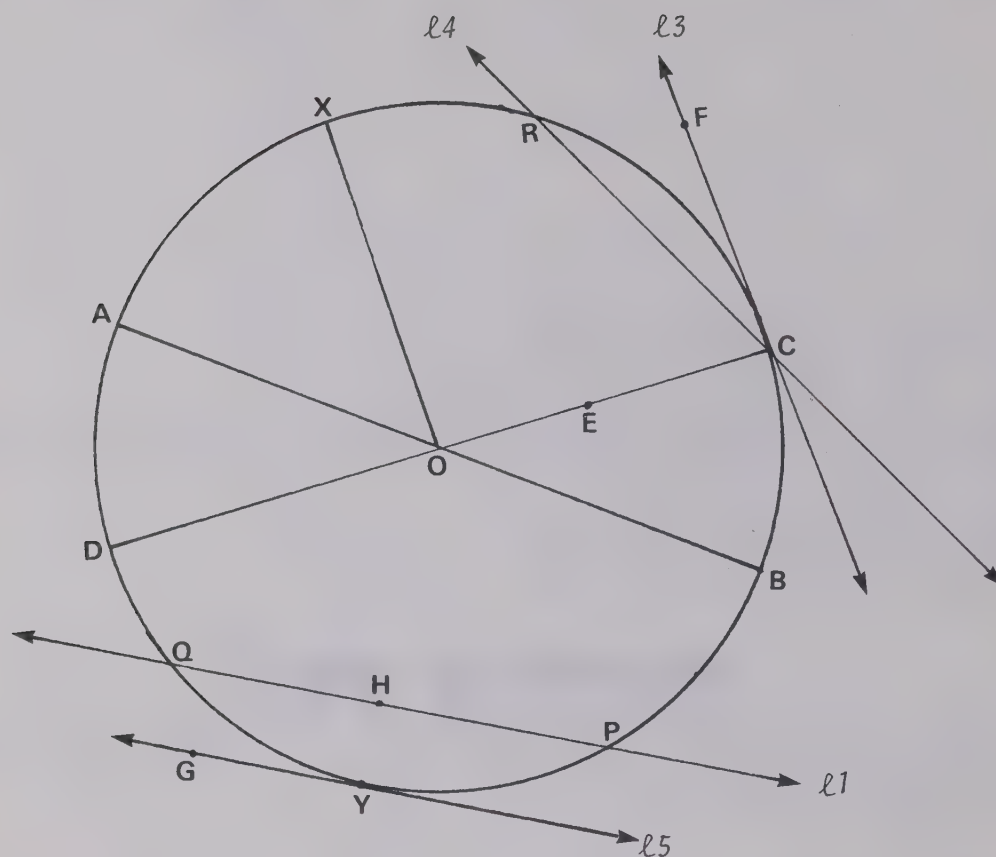


MYSTERY MATH

$$\begin{array}{r} (i) \quad a \ b \ c \ f \\ \quad \times \ d \ e \\ \hline \end{array}$$

$$\begin{array}{r} (ii) \quad a \ e \ d \\ \quad - \ f \ b \ c \\ \hline \end{array}$$

?



1. Name two diameters in the above circle.
2. Name two chords that are not diameters.
3. Name a chord that is a diameter.
4. Name 3 arcs of the circle.
5. How many semi-circles are there in the diagram?
6. Name 2 lines that are tangent to the circle.
7. Name all points indicated in the interior of the circle.
8. Name all points indicated in the exterior of the circle.
9. Name all points indicated on the circle.



EXERCISES:

OBJECTIVE NO. 22

1. (a) Draw Circle A with diameter \overline{CT} .
 (b) Use A as a turn center and execute a $\frac{1}{2}$ turn.
 (c) Does the circle have $\frac{1}{2}$ turn symmetry?
 Therefore, \overline{CT} _____ the circle into two congruent figures.

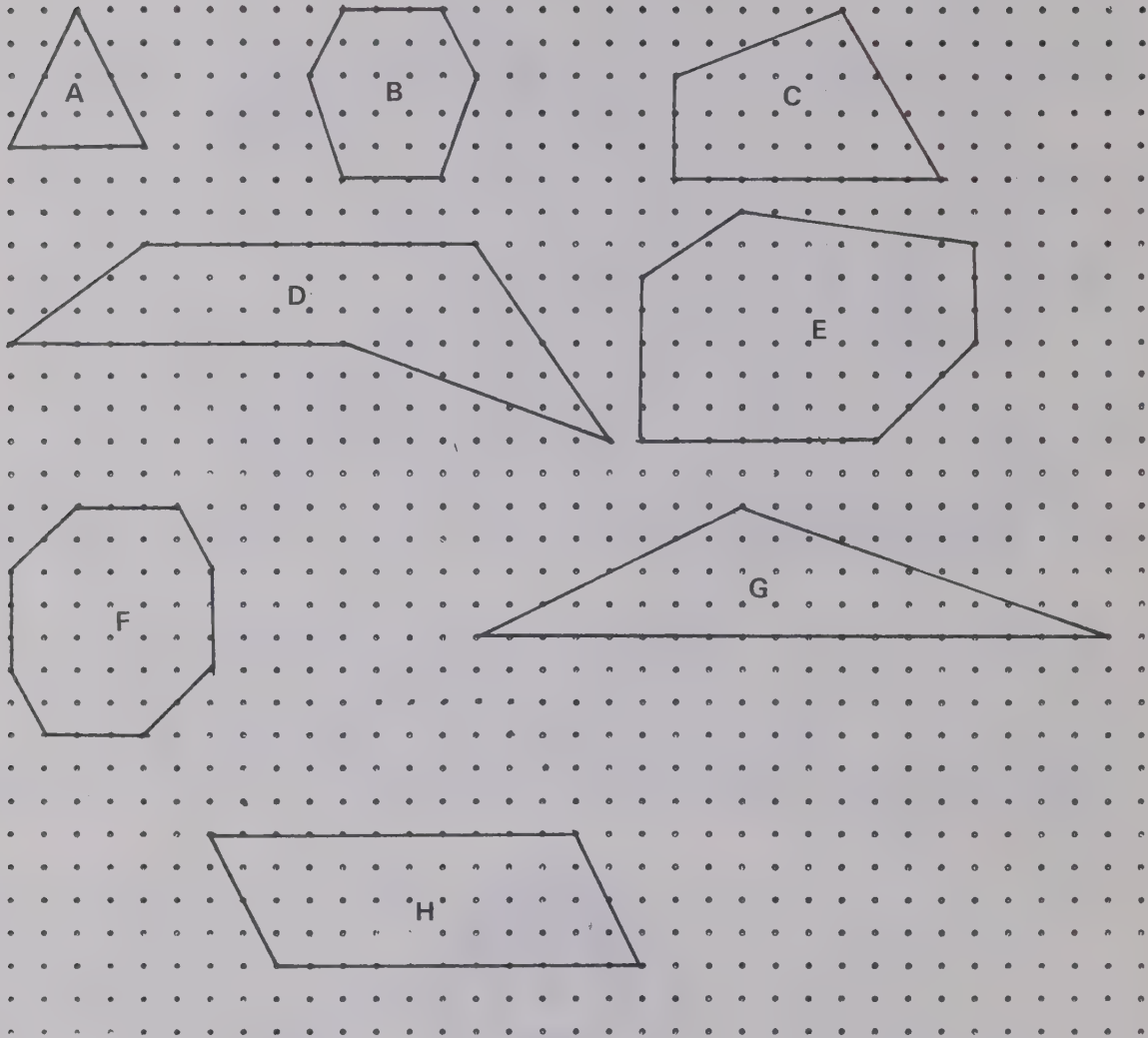
2. (a) Draw Circle A with diameters \overline{CT} and \overline{MN} .
 (b) (i) Slide \overline{CA} onto \overline{AT} , are they \cong ?
 (ii) Slide \overline{MA} onto \overline{AN} , are they \cong ?
 Therefore, a diameter is equal to _____ the radii.

3. (a) Draw Circle A and radii \overline{BA} , \overline{CA} , \overline{MA} , \overline{XA} , \overline{DA} , \overline{RA} , \overline{NA} .
 (b) Use A as the turn center and turn BA until it falls on each of the other radii, are they \cong ?

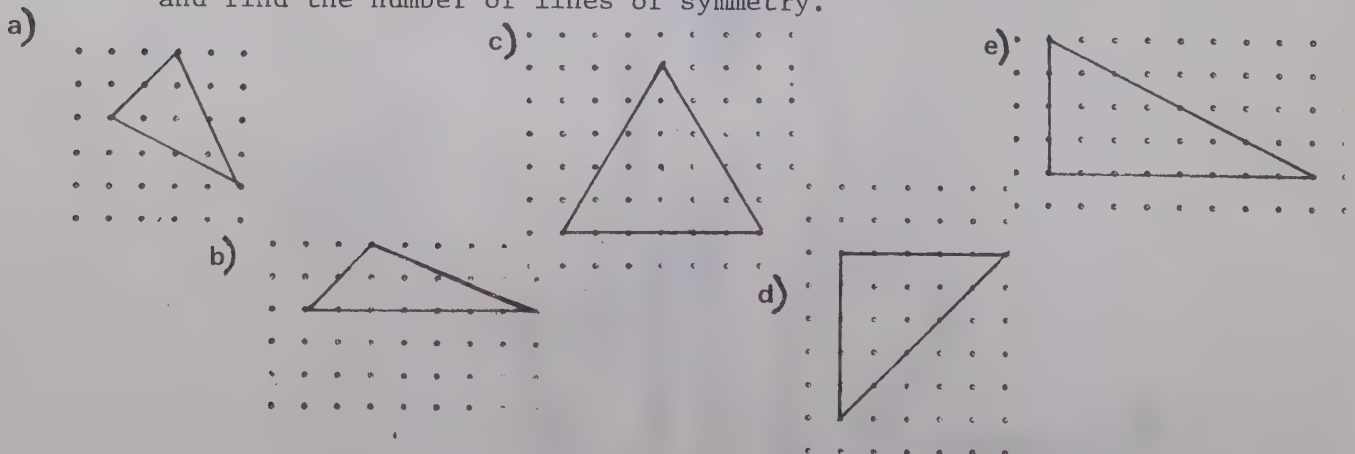
4. Turn \overline{BA} about turn center A for one complete turn.
 Is the tracing of B on the circle throughout the turn?
 Therefore, ALL the points which make up the circle are an _____ distance from the center.



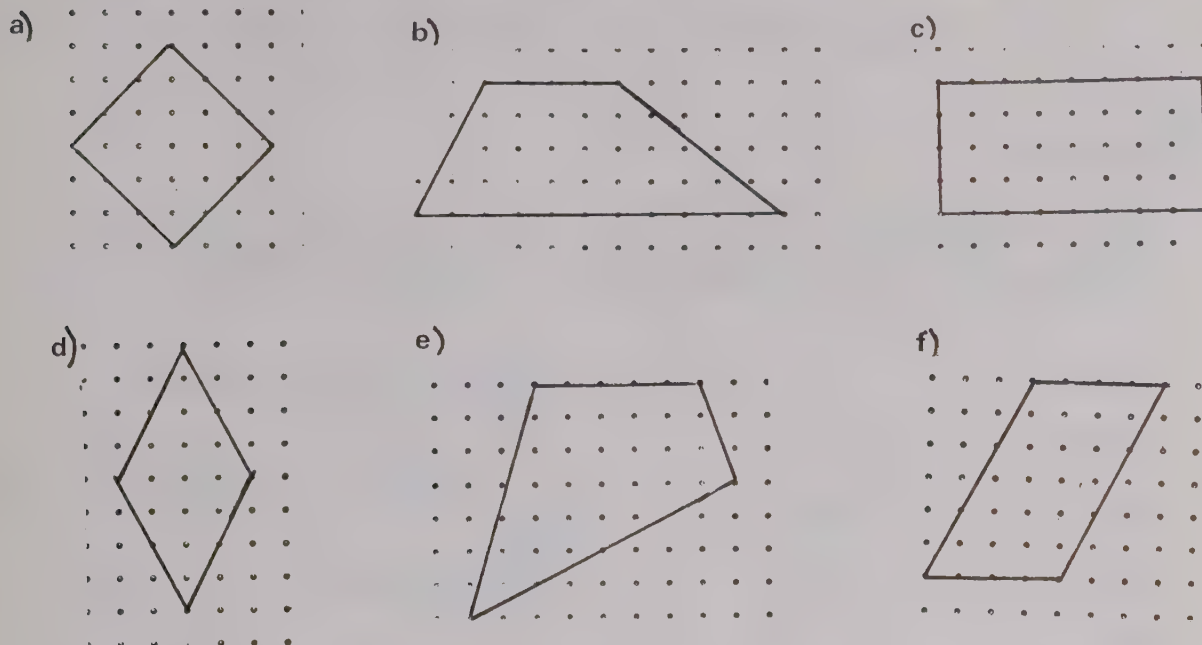
1. Classify the following polygons:



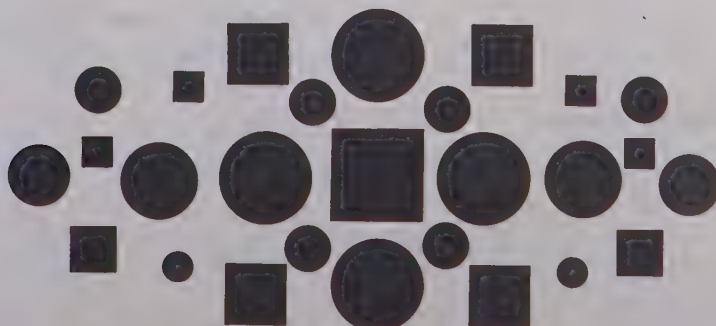
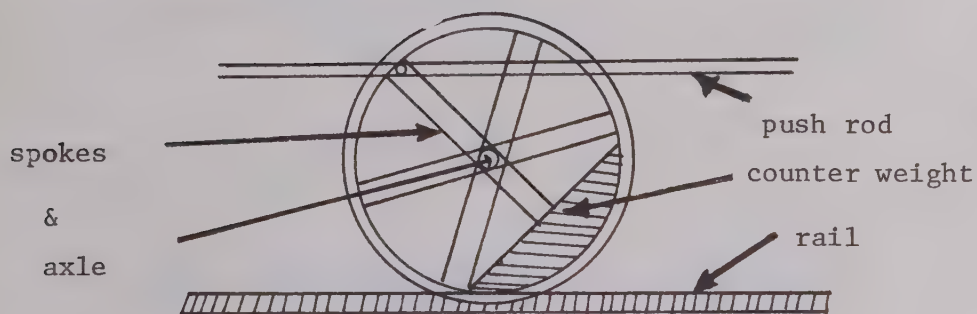
2. Classify each triangle below as isosceles, scalene or equilateral and find the number of lines of symmetry.



3. Classify each quadrilateral below. Give the best name for each.



4. Pictured below is the drive wheel of a steam locomotive standing on a rail. List the parts of a circle shown in the diagram.



YEAR END REVIEW

UNIT: 1 - 7

LEVEL: 7

SET THEORY1. MATCHING

In your book place the letter of the description at the right, in order. If you have chosen the correct words you will have written a sentence about your achievement on this exercise.

- | | | |
|-----------------|-------|---|
| element | _____ | e - a diagram which is used to represent sets. |
| universe | _____ | g - a set which has 15 members is ____. |
| set | _____ | h - $\{0,1,2,3,4,5,\dots\}$ is a ____ set. |
| subset | _____ | i - $\{0,10,20,50\}$ and $\{50,0,20,10\}$ are ____. |
| Venn | _____ | n - a set which has no members is the ____. |
| equivalent sets | _____ | o - a set which contains all possible elements is the ____. |
| equal sets | _____ | o - $\{2,4,6,8\}$ |
| finite | _____ | r - $\{2,8,17\}$ and $\{*,O,\Delta\}$ are ____. |
| infinite | _____ | r - a set which forms part of a larger set. |
| odd numbers | _____ | t - $\{1,3,5,7\}$ |
| even numbers | _____ | u - a collection of things. |
| empty set | _____ | y - another name for a member of a specific set. |

2. Write in expanded form:

- a) $238 \rightarrow$
- b) $16.1 \rightarrow$
- c) $4.007 \rightarrow$
- d) $260.04 \rightarrow$

3. Write in standard form: a) $3 \times 100 + 5 \times 10 + 6 \times 1 \rightarrow$

b) $2 \times 10 + 5 \times \frac{1}{10} \rightarrow$

c) $1 \times 1\,000 + 9 \times 1 + 3 \times \frac{1}{100} + 4 \times \frac{1}{1\,000} \rightarrow$

d) $2 \times 10 + 5 \times 1 + 7 \times \frac{1}{100} + 8 \times \frac{1}{10\,000} \rightarrow$

4. Find the G.C.F. of : a) 3, 4, 6

c) 12, 28, 34

b) 40, 80, 120

d) 36, 60, 120

$$\begin{array}{r} 40 \quad 80 \quad 120 \\ 8 \quad 2 \quad 4 \quad 6 \\ \hline 1 \quad 2 \quad 3 \end{array}$$

5. ADDITION:

a)
$$\begin{array}{r} 237 \\ 691 \\ 13 \\ \hline 272 \end{array}$$

b)
$$\begin{array}{r} 26.01 \\ 1.45 \\ \hline 23.95 \end{array}$$

c) $\frac{2}{3} + 1\frac{1}{3} =$

d) $\frac{5}{16} + \frac{1}{8} =$

e) $5\frac{1}{2} + 2\frac{2}{3} =$

f) $1.61 + 26.4 + 30.02 =$

6. SUBTRACTION:

a)
$$\begin{array}{r} 2061 \\ -158 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 13.040 \\ -6.217 \\ \hline \end{array}$$

c) $238 - 16.93 =$

d) $1268.46 - 93 =$

e) $\frac{7}{8} - \frac{1}{2} =$

f) $1\frac{1}{3} - \frac{4}{5} =$

g) $3\frac{2}{3} - 1\frac{1}{2} =$

7. MULTIPLICATION:

a)
$$\begin{array}{r} 273 \\ \times 19 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 16.04 \\ \times 3.1 \\ \hline \end{array}$$

c)
$$\begin{array}{r} 168 \\ \times 7.11 \\ \hline \end{array}$$

d) $\frac{3}{4} \times \frac{8}{15} =$

e) $2\frac{1}{4} \times \frac{1}{9} = \frac{9}{36}$

f) $3\frac{1}{5} \times 4\frac{1}{16} =$

g) $3 \times 2\frac{1}{3} =$

8. DIVISION:

a) $16 \overline{) 256}$

b) $13.1 \overline{) 6.55}$

c) $20.7 \overline{) 621}$

d) $\frac{1}{3} \div \frac{4}{5} =$

e) $3\frac{1}{4} \div \frac{13}{15} =$

f) $2\frac{1}{2} \div 4 =$

g) $3\frac{1}{3} \div 2\frac{5}{6} =$

$$\begin{array}{r} = \frac{1}{3} \times \frac{5}{4} = \frac{5}{12} \end{array}$$

9. EVALUATE:

a) $3 \times 4 + 70 \div 2 =$

b) $\frac{1}{2}(\frac{3}{4} + \frac{5}{8})$

c) $2.01 + 3.08 \times 2 - 4.5 =$

10. SOLVING CONDITIONS:

a) $x + 7 = 12$

b) $x - \frac{3}{4} = 2\frac{1}{2}$

c) $4.6x = 18.4$

d) $\frac{x}{3.1} = 4.5$

11. MAKE EQUIVALENT FRACTIONS:

$\frac{1}{5} = \frac{x}{100}$

$\frac{3}{8} = \frac{s}{100}$

$\frac{3}{t} = \frac{12}{18}$

$\frac{3}{16} = \frac{9}{a}$

12. MEASUREMENT:

Express in the indicated unit:

a) 18.6 m (cm, km)

b) 238 cm (m, mm)

c) 19.05 dam (m, mm)

13. Answer in Given Units:

a) $124 \text{ mm} + 14 \text{ cm} + 2 \text{ m} = (\text{cm})$

b) $11 \text{ 238 m} - 1.9 \text{ km} + 3.6 \text{ dam} = (\text{m})$

14. EXPONENTS:

$3^5 = 3 \times 3 \times 3 \times 3 \times 3 = 243$

a) What is the base?

b) What is the exponent?

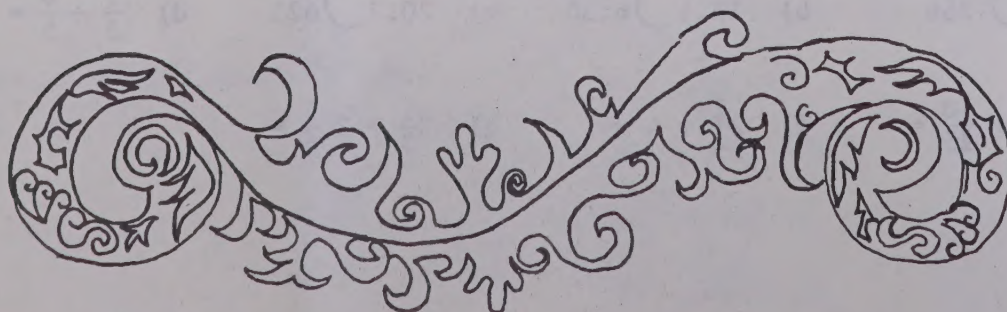
15. CALCULATE:

a) $2^6 =$

b) $5^2 =$

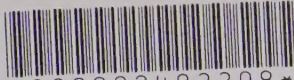
c) $1.8^2 =$

d) $(\frac{1}{3})^4 =$



QA 11 J95 1976 GR-7 BK-B C-3
JUNIOR HIGH MATHEMATICS
CONSORTIUM

JUNIOR HIGH MATHEMATICS
39351319 CURR



000022493308

DATE DUE SLIP

FILE
EDUC. MAR 4 '82

JUN - 8 RETURN

RETURN MAR 30 '82

JUN 19 84

FILE EDUC SEP 28 '83

DATE DUE SLIP

MAR 11 '82

MAR 09 RETURN

DEC NOV 11 '87

NOV 08 RETURN

QA
Jun
Con

C2272